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EDITORS AND PUBLISHERS
HENRY A. PILSBRY

Curator of the Department of Mollusca, Academy of Natural Sciences
PHILADELPHIA

CHARLES W. JOHNSON

Curator of the Boston Society of Natural History
BOSTON

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No. 1

A VISIT TO SWEDEN

BY OLOF O. NYLANDER

I left my home in the woods of Maine Sept. 10, 1923, and stopped one day in Boston to see some friends. Leaving Hoboken, N. J., Sept. 13 on the Scandinavian-American Line steamer "Hellig Olav," I arrived at Christiansand, Norway, on the 24th, and proceeded by rail to Gothenburg, Sweden.

My object was to see the Tercentennial Exposition of Gothenburg and to look over the Museum, especially the collection of Mollusea.

The Biological Museum in Gothenburg is a new building built on the top of a hill in a beautiful park—Slats Skogen. The collection contains many fine specimens and several large panoramic views. Prof. S. A. Jägerskiöld and his assistant, Dr. Paul Henrici, spent much time in showing me the collections. The collection of Bohus Lane is most extensive; the mollusca are arranged in small glass-covered drawers with a fine series of extended animals in alcohol, the best I have seen. In this museum is also the large collection of land and fresh-water shells used by C. A. Westerlund in his publications. Westerlund described many new species that were never illustrated. Prof. Jägerskiöld said that any American malacologist would be given every opportunity to study the collection. With Dr. Henrici's assistance, part of two days were spent in looking through the collection.

On Oct. 2 I left Gothenburg and went to Skara, a city best known for its old cathedrals and fine buildings, seminary and museum of antiquities. In the park near the museum I collected 230 *Helix hortensis* Müll., 44 with five bands on a yellow ground, 123 plain, varying from a bright yellow to pale and nearly transparent, representing the varieties *lutea unicolor* and *albida*. Seventy were the variety *pallida castanea* Westerlund; a fine series of this beautiful brown form were compared with Westerlund types. I spent six days exploring the country about Skara and then returned to Gothenburg.

I had accepted an invitation from Prof. Jägerskiöld to attend a meeting of the Biological Society of Gothenburg, at the Palace Hotel on the 9th, and speak on some Ameriean mollusks—the use of *Mya arenaria* as food, *Busycon perversum* and the Indians' use of shells, the fresh-water mussels of the Mississippi River and the manufacture of buttons; also the abalone shells of California. The meeting was attended by over forty members. Luncheon was served. Professor Carl Skogsberg presided at the meeting.

On Oct. 11th I went to Boras, one of the large manufacturing cities, to meet Herr Berthold Sundler, an enthusiastic collector, who has a fine collection, and has done excellent work in this part of Sweden. In his paper, "Snäckor och Musslor i Viskans övre Vattenomrade," he ably explains the ecological conditions bearing on the destruction of species. It might be of interest to note that he considers *Planorbis (Armiger) crista* L. and *P. (Armiger) nautilus* L. distinct species, and seems to have good reasons for doing so. In company with Herr Sundler I visited several of his favorite collecting places, but it was too late in the season for good collecting. I also visited the Historical Museum.

On Oct. 13th I reached Stockholm, the most beautiful city I have seen. The "Riksmuseet" and many other Government institutions are in new buildings some distance out of the city, known as "Vetenskaps-staden." Dr. Nils Hy. Odhner spent several days taking me through the museum and showing me the large collection of arctic mollusks collected during the last century by the various Swedish explorers. I received in

exchange a number of interesting arctic species. Dr. Odhner is well known in America for his many valuable papers. Dr. A. d'Ailly, who spends much time working on the large collection of land shells, showed me many of the rare and beautiful species. I am under great obligation to both of these gentlemen for their many kindnesses and assistance.

October 21 to 23 I spent in the city of Upsala, famous for its cathedral, university, library and botanical garden. Prof. Carl Wiman kindly showed me the collection of fossils in the museum, and Prof. Erik Stensia assisted me in the library, showing me some rare books, and gave me much valuable information.

I next visited Lund. This city has many historical landmarks and museums. The floors of the Natural History Museum had just been varnished and I had no chance to see the collections, but I had a pleasant time with Ansamunsen "Hans Lohmander," who has worked on the mollusks of Sweden and has a large private collection.

From here I went to the old city of Ystad on the Baltic. In the harbor I collected small specimens of *Cardium edule* and *Macoma balthica*. I next visited the old fishing village Abfekas. Here I found *Mya arenaria*, rare in the Baltic. I then went to Öremölla, where, in a ditch near the school house, I collected *Helix hortensis* (10 plain and 2 five-banded). This was a surprise to me, for fifty years ago when I went to this school I never saw a specimen at this place. In the old church yard at Skifvarp I also obtained *H. hortensis*, 2 plain and 12 five-banded. I then went to "Härte Skag" in company with an old friend. On the tree trunks I collected 2 plain and 8 five-banded *H. hortensis*; there were hundreds of young shells on the trees from 10 to 15 feet from the ground. A short distance east of here, on the shore of the Baltic, I collected in 1878, 16 specimens of *Neritina fluviatilis* that are still in my collection.

My next stopping place was "Smyge Fiskelage," the most southern part of Sweden. Here I collected *Macoma balthica* and *Mytilus edulis*. Visiting the church in Ostra Torp I found on the gravestones 35 *H. hortensis*, all the five-banded

form. In this graveyard my father's ancestors are laid at rest. At "Klagstorp" I visited one of my school teachers, and together we went to the churchyard, and on the monument and evergreens collected 10 plain and 15 banded *H. hortensis*. This was my last collecting; it was really too late in the year to accomplish much. On Nov. 7th I bid my friends in Ostra Torp farewell and went to Trelleborg and then to Malmö, my last stop in Sweden.

November 10 to 13 was spent in Copenhagen visiting the museums. I met Dr. Theodor Mortensen. He said the fauna on the east coast of Denmark was poor, owing to the great amount of fresh water from the Baltic; he also told me about his expedition to Kei-Öarna, where he made a large collection. Magister of Science R. Spärck showed me the collection of Denmark Mollusea, and kindly gave me some specimens from the deep water of the Baltic and from Iceland and Greenland. Leaving Copenhagen on Nov. 14th, I stopped in London on the 16th and had a glimpse of the British Museum. Arriving in New York on the 23rd, I spent the next day in the American Museum of Natural History, the 26th at the Boston Society of Natural History, and was glad to be so near home again after ten busy weeks abroad.

POLYGYRA APPRESSA LINGUIFERA AND SANCTA GEORGIENSIS

BY H. A. PILSBRY AND E. G. VANATTA

An examination of the history of the Bermudan form of *Polygyra appressa* called *Helix sancta Georgiensis* led to the investigation of *Helix linguifera* of Férußac and Lamarek. This name has long rested as a synonym of *appressa* Say.

The name *H. linguifera* was first listed by Férußac in 1821, without a description, but with the locality "Les environs de Nogeville, état de Tenesse." This is evidently Knoxville. Two years later, Férußac published three figures. Meantime Lamarek had published a description giving the same locality. Férußac's figures and Lamarek's description, so far as it goes, agree very well with shells collected by one

of us in 1899 at Knoxville, on the south side of the river. These specimens had been referred to *P. appressa sculptior* Chadw. They are not typical of that subspecies as described from Scott Co., Virginia, the periphery being more distinctly angular in front, and the striation a little stronger and less close. Both of these characters are seen in Féruccae's figures. The granular sculpture, however, is similar to *sculptior*. We doubt whether there is sufficient difference to call for two subspecies. In this view, the subspecies will be called POLYGYRA APPRESSA LINGUIFERA (Lamarek), with the following synonymy:

Helix linguifera Féruccae, Tableaux Syst. de la Famille des Limaçons, 1821, p. 33, no. 95. Les environs de Nogeville, état de Tenessé. Nude name.

Helix linguifera Lamarek, Anim. sans Vert. VI, pt. 2, 1922, p. 90. Nogeville, état de Ténessé.

Helix linguifera Fér., Hist. Nat. des Moll., pl. 49A, fig. 3 (1823).

[*Polygyra appressa*] *sculptior* Chadwick, Nautilus XIII, Sept. 1899, p. 54. Scott Co., Virginia.

Helix sancta Georgiensis Temple Prime, The Bermuda Pocket Almanac, 1853, p. 55. Bermuda. Nude name.

Helix sancta Georgiensis W. G. Lane, Five Essays, etc., The Spiral Snails of Bermuda (no date, but about 1892), p. 2. Nude name.

Polygyra appressa, with the synonym *Helix sancta georgiensis*, Verrill, Trans. Conn. Acad. Sci. XI, 1902, p. 732, text figure 75 d, e, f on p. 730.

The Bermudan form cannot be said to be quite *linguifera* or *sculptior*. It has their characteristic granulation, but is slightly heavier in shell and lip, and in the average smaller than either. Strictly speaking, both *sculptior* and *sanctageorgiensis* have their own slight but recognizable racial characters; but they appear to be subvarieties of *linguifera*. All of the Bermudan "appressa" we have seen, many specimens from several collectors are of the *sanctageorgiensis* form.

Typical Knoxville *P. a. linguifera* are 16 to 17 mm. diameter. The type lot of form *sculptior* measure 15 to 18 mm. The form *sanctageorgiensis* measures 12 to 15.2 mm. diameter.

Though the name *H. sancta Georgiensis* was used as early

as 1853, it was first defined in 1902 by Verrill's figures. The prior notices gave no clue to its characters beyond the association with *appressa* and the locality Bermuda.

THE AFFINITIES OF *BALEA AFRICANA* MELVILL AND PONSONBY.

BY H. A. PILSBRY

In the course of an attempt to estimate the relations of the South African fauna to other divisions of the Ethiopian Region I had occasion to examine *Balea africana*.¹ It has little in common with the European genus *Balea*, being much more like the Japanese *Reinia*² in shape, small number of whorls and texture; but it differs by the further reduction of apertural armature. Just where the African species belongs in the system of Clausiliidæ remains uncertain. The shell is so much simplified that recourse must be had to the soft anatomy; but it is certainly not related to *Balea*.

AUSTROBALEA, new genus.

Shell shortly Clausilia-shaped, of few (6-7) whorls. Aperture toothless, with slightly expanded, incomplete peristome. There is a well-developed, wholly immersed subcolumellar lamella within the dorsal side, but no other lamellæ or plicæ. No clausilium.

Type *Balea africana* M. & P. Specimens examined from Karkloof, Natal, collected by H. C. Burnup.

LAND SHELLS OF ADMIRAL'S CAVE, BERMUDA.

BY E. G. VANATTA

The following species were picked from shell-dirt collected by Mr. Hiram C. Hoyt in 1922. Mr. Arthur Haycock writes: "Admiral's Cave has an opening in the rock in the roof of the cave large enough to put your hand through. It is imme-

¹ Melvill and Ponsonby, Ann. Mag. N. H. IV, 1899, p. 198.

² See Pilsbry, Proc. A. N. S. Phila. 1901, p. 471.

dately below this where the deposit of shells is, and of course recent ones have easy access. Admiral's Cave is between the road leading to the causeway and the road leading to the old Ferry—an $\frac{1}{8}$ mile from the causeway and nearer this road than the Ferry one. All the caves and caverns in the rock around here are likely places for fossil shells."

Species which have been found fossil only are marked thus †.

Thysanophora hypolepta ('Shutt.', Pils.)

Gastrocopta rupicola marginalba (Pfr.)

Vertigo numellata Gul.

Strobilops hubbardi Brown

† *Poecilozonites nelsoni* (Bld.)

Poecilozonites bermudensis (Pfr.)

Poecilozonites reinianus (Pfr.)

† *Poecilozonites blandi heilprini* Pils.

† *Poecilozonites vanattai* Pils.

Poecilozonites circumfirmatus Redf.

Zonitoides bermudensis P. & V.

Zonitoides minuscula (Binn.)

† *Punctum bristoli* (Gul.)

† *Carychium bermudense* Gul.

The specimens of *Carychium bermudense* are quite variable in size; three measure:

Length 2.25, diameter 1.25 mm.

Length 1.9, diameter 1.1 mm.

Length 1.6, diameter 0.9 mm.

A REMARKABLE CAECID FROM FLORIDA.

BY W. H. DALL

Among some shells sent from Florida by Mr. N. C. Lermond were eleven specimens of a Caecum collected at Boca Ciga Bay, which present some unusual characters.

CAECUM (MEIOCERAS) LERMONDI n. sp.

Shell minute, smooth or with faint incremental wrinkles,

subarcuate with an obscure medial swelling; color lucid whitish with four longitudinal rows of small dark brown spots articulated with opaque white spots; two lines are most conspicuous on each side of the convex back of the shell, the other two on each side of the concave portion of the shell are fainter, and sometimes obsolete; in one specimen the space between the upper and lower lines on each side is pale brown; to these color lines are added more or less evident, transverse, equally spaced, brownish lines which give the shell a segmented aspect curiously like that of a small maggot; the colors differ in strength in different specimens; the posterior end of the shell is attenuated and decurved, the posterior aperture small, with a minutely mucronate plug; the anterior end of the shell is larger, the aperture very oblique, almost horizontal, its margin simple, not expanded, nor is there any constriction behind it; the operculum is brownish; length, 2.5; maximum diameter at girdle, 1.0; diameter of aperture, .05 mm. U. S. Nat. Mus. Cat. No. 333531.

When color is present in Caecidæ, it is usually either uniform over the whole shell or nebulously distributed. The present species is the first I have been able to trace which has developed a color pattern. It is quite possible that these colors are fugitive, at any rate they differ considerably in strength in different specimens. There is also some difference in the size of different individuals. The measurements given are those of the largest of the lot.

Besides the types in the National Collection, others are in that of Mr. Lermond.

FRESHWATER MOLLUSCA FROM MACKENZIE RIVER BASIN, CANADA.

BY E. J. WHITTAKER¹

While engaged in work for the Geological Survey for several seasons between 1917 and 1922, the writer, as occasion permitted, made collections of the freshwater molluscs of the

¹ Published by permission of the Director of the Geological Survey of Canada.

area traversed. This included the south shore of Great Slave lake, the Mackenzie river as far as Fort Simpson, the Liard river from its mouth to the South Nahanni river, and Hay, Horn, and Kakisa rivers, all tributary to the Mackenzie river. The writer is greatly indebted to Mr. F. C. Baker for identification and checking of species of these molluses, exclusive of Sphaeriidae, and to Doctor W. H. Dall and Doctor V. Sterki for identification of members of the above mentioned family. Through the kindness of Doctor E. M. Kindle the writer has been permitted to include collections made by him from Fort Wrigley and Big Island, and additional material from Mills lake and Hay river.

Collections were made from thirteen localities in all, which are listed in order below and designated by number. In the succeeding table the number at the top of each column refers to the locality to which that number has been assigned.

List of Localities with Number of Species Taken at Each.

1. South shore, Fawn lake, Horn river. 8 species.
2. South shore, Second lake, Horn river. 11 species.
3. Southwest side of Mackenzie river, 30 miles above Fort Providence. 16 species.
4. Western end of Lake Kakisa. 10 species.
5. South shore of Lake Kakisa near mouth of Kakisa river. 13 species.
6. Head of Lower Rapids, Liard river, 36 miles above Fort Simpson. 4 species.
7. At junction of South Nahanni and Liard rivers. 2 species.
8. Mills lake at mouth of Horn river. 6 species.
9. At mouth of Hay river. 10 species.
10. South shore near Sulphur Point, Great Slave lake. 5 species.
11. Big Island, head of Mackenzie river. 2 species.
12. Near Fort Wrigley. 2 species.
13. South side, Mills lake. 14 species.

From the above localities a total of 43 species were obtained which supplements considerably the excellent lists with de-

scriptions given by Dall in the Harriman Alaskan Expedition series.¹ Seventeen forms of pelecyopods and twenty-six species

¹ Dall, W. H., Harriman Alaska Expedition, Vol. XIII, Land and Fresh-Molluscs, 1910.

of gastropods, including six terrestrial forms, were recognized. The following list gives their distribution at the different localities:

Pelecypoda.

Family UNIONIDÆ.

- Anodonta grandis footiana* Lea. 4.
- Anodonta grandis* var. *imbricata* Anthony. 5.
- Anodonta* var. 9.
- Strophitus edentulus* var. 9.
- Lampsilis superiorensis* Marsh. 4, 9.

Family SPHAERIIDÆ.

- Sphaerium vermontanum* Prime. 12.
- Sphaerium canadense* Sterki ms. 5, 9, 12, 13.
- Sphaerium solidulum* Conrad. 4.
- Sphaerium striatinum* Lamarek. 4.
- Sphaerium tenue* Prime. 2, 3, 5, 13.
- Sphaerium tumidum* Baird. 10?, 12.
- Musculium jayense* Prime. 1.
- Musculium rosaceum* Prime. 13.
- Pisidium compressum* Prime. 13.
- Pisidium indianense* Sterki. 2, 9.
- Pisidium scutellatum* Sterki. 1, 2, 3, 5, 13.
- Pisidium ventricosum* Sterki. 2.
- Pisidium*, two sp. 5.

Gastropoda.

Family ZONITIDÆ.

- Euconulus fulvus* Müller. 6.
- Zonitoides nitidulus* Müller. 4.

Family ENDODONTIDÆ.

- Pyramidula cronkheti* Newcomb. 3, 6, 7, 13.

Family SUCCINIDÆ.

- Succinea avara* Say. 3, 13,
Succinea chrysostoma Westerlund. 6, 7.
Succinea retusa Lea. 3.

Family LYMNAEIDÆ.

- Lymnaea catascopium* Say. 1, 4, 5, 11.
Lymnaea catascopium var. 4.
Lymnaea obrussa decampi var. *strengi*. 3, 8.
Lymnaea palustris Müller. 2, 3, 8, 9, 10.
Lymnaea palustris alpenensis Baker. 13.
Lymnaea stagnalis appressa Say. 3, 9.
Lymnaea stagnalis var. 1, 4, 8, 11.
Lymnaea vahlii (Beck) Müller. 8.
Planorbis arcticus Müller. 1, 2, 4, 5, 13.
Planorbis deflectus Say. 9.
Planorbis exucuus Say. 2, 5.
Planorbis hirsutus Gould. 1, 6.
Planorbis parvus Say. 2, 3, 5, 13.
Planorbis trivolvis Say. 3.
Planorbis subcrenatus Cpr. 1, 3, 9.
Segmentina armigera Say. 9.
Segmentina christyi Dall. 1, 3, 8, 13.

Family AMNICOLIDÆ.

- Amnicola emarginata* Küster. 3, 5, 10, 13.

Family VALVATIDÆ.

- Valvata lewisii* Currier. 1, 2, 3, 5, 10.
Valvata lewisii helicoidea Dall. 2, 4, 8, 13.
Valvata tricarinata Say. 2, 3, 4, 5, 10, 13.

As noted above, there is a considerable variation both in numbers and species at the different localities. Seventeen species are added to those listed by Dall from the Mackenzie basin.

Lampsilis superiorensis is exceptionally abundant in Hay and Horn rivers. Thousands are stranded and die on the banks in early midsummer as the flood waters recede, and piles of the dead shells are to be seen everywhere. On the

other rivers of the area, though conditions seem exactly the same, this species is rare or absent.

The species recorded from south shore of Great Slave lake really come from a small pond fifty yards back from the beach but connected with the lake proper at high water. Shells are very rare along the beach owing to the fact that, in the break-up of the ice, the latter is driven up on the beach, destroying a large part of the molluscan life.

The fact that casual collecting undertaken while the writer was engaged in other work resulted in increasing the distribution area of seventeen species should encourage all collectors who have an opportunity of visiting northern latitudes. However, owing to the boreal and semi-boreal character of the climate, which imposes a certain amount of uniformity on the fauna, the number of new species found in any one area is not likely to be large.

A NEW SPECIES OF *PHYSA* FROM TEXAS.

BY WILLIAM J. CLENCH

The following description is based upon four specimens sent to me by L. J. Bottimer, of Liberty, Texas.

PHYSA BOTTIMERI n. sp.

Shell: sinistral, small, subglobular, imperforate, rather thin, corneous. Color: light horn with a rather dull surface.

FIG. 4.



Physo bottimeri, X 3.

Whorls: $4\frac{1}{2}$, the last shouldered and very large. Spire: very short, the nuclear whorl dark reddish brown in color. Aperture: large, five-sixths of the total length of the shell, the outer edge slightly straightened. Lip: lower half slightly flaring. A well-developed white callus formed along the edge continuous with the base of the columella. Columella: straight, with a well-defined, slightly thickened fold. Suture: well impressed. Sculpture: composed of

fine growth lines, a few coarser lines spaced at irregular intervals producing a somewhat costated appearance. Cross striae absent.

Type: Length 6.6, width 4.8, aperture length 5.5 mm. (U. of M. No. 31617.)

Cotype: Length 6.3, width 4.8, aperture length 5.5 mm. (Walker, No. 75895.)

Cotype: Length 6.4, width 5.0, aperture length 5.8 mm. (Clench, No. 1378.)

Cotype: Length 5.5, width 4.4, aperture length 4.8 mm. (A. N. S. Phila.)

Type locality: Comanche Spring, Fort Stockton, Peeos Co., Texas.

Remarks: This species of *Physa* is rather small as compared with other species of the genus, especially among the shoulered forms. It agrees with *Physa lordi* Baird in general outline but differs in being smaller in size, in having a white lip callus, and less thickening and folding of the columella. A well-formed callus is found on the type and two of the cotypes; this callus is lacking on the fourth, a juvenile specimen.

Type deposited in the Museum of Zoology, University of Michigan; cotypes in the collection of Dr. Bryant Walker of Detroit, in my own collection, and in that of the Academy of Natural Sciences of Philadelphia.

RADULA TECHNIQUE FOR PHYSA.

BY WILLIAM J. CLENCH
University of Michigan

The following method has been found excellent for the extraction, staining and mounting the radula of *Physa*. As a preliminary preparation in the field the mollusks were killed by boiling and were then preserved in 70% aleohol. Placing the *Physa* in a strainer and then dipping in boiling water for thirty seconds was found to be the best method. This allowed easy extraction of the animals from the shells. When time

was available for the study of the radulæ, the head and foot were cut from the rest of the body and dropped into a test-tube containing a solution of potassium or sodium hydroxide (20 to 40%). The animals remained in this solution for two or three days, macerating slowly with the aid of radiator heat. Usually at the end of forty-eight hours the radulæ were free from the animal tissue and were then transferred to distilled water. From the water the radulæ were transferred first to chrom-osmic acid, next to crude pyroligneous acid, and then to 96% alcohol. Only a small amount of each acid, sufficient to cover the radulæ, is necessary.

Euparol was found to be excellent for mounting, much superior to balsam, inasmuch as complete dehydration and clearing is unnecessary. Furthermore, the refractive index of euparol is considerably less than that of balsam, hence fine details are better revealed under high power. The radulæ can be transferred directly from the 96% alcohol to the mounting medium. In the following outline the general procedure for the method is stated in brief form.

20-40% potassium or sodium hydroxide, 48-72 hours
Distilled water, 15 minutes
Chrom-osmic acid, 2-3 hours
Crude pyroligneous acid, 12-24 hours
96% alcohol, 15 minutes
Euparol.

The chrom-osmic acid is made by dissolving 1 gram of osmic acid in 50 cc. of a 1% solution of chromic acid. Best results will be obtained by using thin Euparol. Diaphane or Mountene may be used in place of Euparol, as these three mounting mediums are the same but sold under different trade names.

This is an impregnation method of staining and results in a uniform opaque brown stain.

A NEW PHYSA FROM CALIFORNIA.

BY FRANK COLLINS BAKER

Of the University of Illinois, Urbana, Illinois

PHYSA MARCI, new species.

Shell small, sinistral, elongate-ovate; whorls 4-5, flatly rounded; spire short, acutely dome-shaped, one-half as long as aperture; body whorl compressed, flatly rounded;

FIG. 5.



color yellowish or greenish horn; sculpture of coarse lines of growth with no (or but very fine) spiral impressed lines; sutures well impressed, deeply so between body and penultimate whorl; aperture elongate ovate, widely rounded below, acutely angled above, occupying two-thirds of the length of the shell; peristome thin, sharp, with rarely an indication of internal rib; columella covered with a thick, very wide callus, which is especially wide near the umbilical region, either completely closing the umbilicus or leaving a very small, narrow chink; color of interior of aperture whitish.

Length 6, width 4; aperture length 4.1, width 2 mm. Type.

Length 4.5, width 3.3; aperture length 3.2, width 1.5 mm. Paratype.

Type locality: Little Valientia Spring (hot sulphur spring), Santa Barbara National Forest, California. Collected by Mr. Marcus Dall.

This little *Physa* differs from all other species at present known from the southwestern part of the United States. It somewhat resembles small forms of the eastern *Physa gyrina* Say, but differs wholly in sculpture as well as in size. *Physae* from chemical springs are apparently rare. The small size and form of this species are probably due to the environment which seems to have inhibited growth.

Type, Cat. No. 359544, United States National Museum. Paratype, No. Z14210, Natural History Museum, University of Illinois. Cat. No. 359545, U. S. N. M., contains a paratype, and Cat. No. 359546, U. S. N. M., 18 specimens, all from the type locality.

NOTES ON LACUNA FROM THE CALIFORNIA COAST.

BY A. M. STRONG

Dr. Dall in his List of Northwest Coast Marine Shellbearing Mollusea gives nine species and varieties of *Laeuna* as occurring on the California Coast. The ranges and references given indicate a considerable revision in the nomenclature of the genus. The following notes give a brief review of the California species.

Lacuna divaricata Fab., 1780 (*Fauna Gronlandica*, p. 392), is a very variable circum boreal shell with a wide range. In the Pacific it is listed as ranging from Norton Sound, Alaska, to Santa Barbara, California. Tryon's *Man. Conch.*, vol. 9, p. 265, gives a long list of synonyms including *L. vincula* Mtg., *L. solidula* Loven, and *L. ?var. compacta* Cpr. The first of these is mentioned by Carpenter and others from Alaska but it is now considered by Dr. Bartsch to be a distinct Atlantic species. (*Nautilus*, vol. 35, p. 89). The second is also accepted as a distinct species occurring in both the Atlantic and Pacific but the position of the third is left uncertain. The typical form of the species is figured in Tryon's *Man. Conch.*, vol. 9, pl. 50, fig. 75.

Lacuna solidula Loven, 1846 (*Index Moll. Seand.*, p. 23), is listed by Dr. Dall as occurring in the Pacific from Puget Sound to San Diego. Dr. Baker adds Ellamar, Alaska (*Nautilus*, vol. 24, p. 44). It is figured in Tryon's *Man. Conch.*, vol. 9, pl. 50, fig. 69. Dr. Arnold recognizes it as a Pleistocene fossil in Southern California (*Pal. San Pedro*, p. 303), and gives as synonyms *Littorina pedroana* Conr. and *Modelia striata* Gabb.

Dr. Gould described a shell from Puget Sound under the name of *Laeuna carinata* (*Proc. Boston Soc. Nat. Hist.*, 1848, p. 75), which Dr. Carpenter considered to be the same as *L. solidula* Loven, from the Atlantic. Dr. Arnold described a Pleistocene fossil from San Pedro as *L. compacta* Cpr. (*Pal. San Pedro*, p. 302), and for a figure referred to Tryon's *Man. Conch.*, vol. 9, pl. 50, fig. 71. This is the figure for *L. carinata*.

Gould. Dr. Carpenter's shell was described as *Lacuna* (? *solidula* var.) *compacta* Cpr., from the Swan collection at Neah Bay, Wash. (Ann. & Mag. Nat. Hist., vol. 14, 1864, p. 429). If the descriptions correctly represent the type specimens these three would all seem to be the same shell, which should take the name of *Lacuna solidula* var. *carinata* Gould. For range, Dr. Arnold gives, living, Vancouver district (Carpenter). Specimens from Dana Cove, Orange County, California, have been identified by Dr. Dall as *L. (solidula* var.) *carinata* Gould.

Lacuna porrecta Cpr., 1864, and varieties *effusa* Cpr. and *exaequata* Cpr., were described from the Swan collection at Neah Bay, Wash. (Ann. & Mag. Nat. Hist., vol. 14, p. 429). The species is listed as ranging from Bering Sea to San Diego and is figured in Tryon's Man. Conch., vol. 9, pl. 50, fig. 55, and in Bull. U. S. Nat. Mus., No. 112, pl. 14, fig. 2. Variety *effusa* Cpr. is listed as ranging from Fuea Straits to San Francisco, while variety *exaequata* Cpr. is only known from the type locality. Both forms are figured with the typical in Tryon's Man., figs. 56 and 57. A third variety, *puteoloides* (Cpr. MS.) Dall, 1919 (Proc. U. S. Nat. Mus., vol. 56, p. 349), is listed from Lobitas, California, and remains unfigured. Dr. Arnold recognizes the species as a Pleistocene fossil in Southern California (Pal. San Pedro, p. 303).

Lacuna unifasciata Cpr., and variety *aurantiaca* Cpr., were described from Col. Jewett's collecting at Santa Barbara (Proc. Zool. Soc., London, 1856, p. 205). The name *unifasciata* Cpr. has been applied to a group of California shells which Dr. Dall seemingly divides into three species. He gives the shell figured in Tryon's Man. Conch., vol. 9, pl. 50, fig. 74, as the true *unifasciata* of Dr. Carpenter. The range is given as Santa Barbara, California, to Magdalena Bay, Lower California. Variety *aurantiaca* Cpr. has not been figured, the range is given as from Santa Barbara to Point Abreojos, Lower California.

Lacuna marmorata Dall, 1919 (Proc. U. S. Nat. Mus., vol. 56, p. 348) is the shell described in Keep's West Coast Shells and listed in Packard's Mollusean Fauna from San Francisco

Bay as *L. unifasciata* Cpr. It is figured in Tryon's Man. Coneh., vol. 9, pl. 50, fig. 58, as *L. variegata* Cpr. The range is given as from Saginaw Bay, Alaska, to San Diego, California. This seems to be the most common species in California.

Lacuna variegata Cpr., 1864, was described from the Swan collecting at Neah Bay, Wash. (Ann. & Mag. Nat. Hist., vol. 14, p. 429). Of the figures given in Tryon's Man. Coneh., vol. 9, pl. 50, Dr. Dall considers fig. 64 to come nearest to it. This figure is given as *L. fusca* Binney, a form of *L. divaricata* Fab. The range is given as from Neah Bay, Wash. to Monterey, but it has been collected at several points in Southern California as far south as Reef Point, Orange County.

The last three species and var. *aurantiaca* Cpr. are quite similar in form and texture, but in typical specimens the color pattern is quite different. *L. unifasciata* Cpr. is uniformly light brown with a narrow brown line on the keel of the body whorl. Var. *aurantiaca* Cpr. is orange white without color markings. In *L. marmorata* Dall, the keel of the body whorl is marked by alternating white and brown spots and a spotted pattern frequently extends over more or less of the shell. The colors of *L. variegata* Cpr. are clouded or in zigzag stripes and the keel of the body whorl is often marked by white splashes. The details of the color pattern vary considerably and fade in dead shells and cabinet specimens. If the separation into different species is to be based on this color pattern, var. *aurantiaca* Cpr. should be given specific rank. It might just as well be a variety of one species as of the other.

NOTES ON ACANTHINA FROM CALIFORNIA.

BY A. M. STRONG

The proper arrangement of the various forms belonging to the genus *Acanthina*, formerly *Monoceros*, which are to be found in California has been a puzzle to all the writers. The few specimens which reached the early writers were seemingly easily separated into distinct species and a number were

named. As larger series became available for study many intergrades were found and the question of varieties and later of priority of names became a difficult one. Dr. Dall in Bulletin U. S. National Museum, No. 112, 1922, recognizes *Acanthina spirata* Blainville, 1833, as the first name used and therefore the typical form. All other California forms, with the exception of two species from the southern fauna found as far north as San Diego, are reduced to varieties.

Conrad in 1837 described three species from Santa Barbara, *Monoceros engonatum*, *Monoceros brevidens*, and *Monoceros lapilloides*. At about the same time Sowerby described *Monoceros punctulata* and *Monoceros unicarinatum*. At various later dates the specimens in the early European collections were redescribed and figured by Reeve, Deshayes, Gray and Keiner, seemingly without much regard to the use of the names. Dr. Carpenter in the Proc. Zool. Soc., 1856, p. 228, gives the synonymy as follows:

MONOCEROS ENGONATUM Conrad

= *Monoceros unicarinatum* Reeve, non Sowerby nec.
Deshayes
= *Monoceros unicarinatum* pars, Deshayes
Comp. *Purpura spirata* Blainv.

MONOCEROS BREVIDENS Conrad

= *Monoceros unicarinatum* Sowerby non Reeve nec.
Deshayes
Non *Monoceros brevidentatum* Gray

MONOCEROS LAPILLOIDES Conrad

= *Monoceros punctulatum* Sowerby
= *Monoceros punctatum* Gray
= *Monoceros punctatum* Reeve

Dr. Carpenter's comments in this connection are of interest. Under *M. engonatum* Conrad he says: "The shell figured by Conrad and found in Mr. Nuttall's collection is very triangular, with a pointed base. The *P. spirata* of Blainville is a Sandwich Island shell, brought by M. Botta, very obtusely angulated, with a swollen base, scarcely acaanthoid, and a canal long enough for Chorus, Gray. It is remarkable for the sealy keel of the upper whorls. This shell is reproduced by Keiner

in a different form, who affiliates Sowerby's species to that in the Paris Museum. Deshayes, copying this error, and not even adopting Blainville's earlier specific name, gives the name and reference of Sowerby, with a description in the main belonging to the Blainville species, although perhaps with some additions from Sowerby's figure. Mr. Reeve completes the confusion by describing a shell, 'anfr. superne angulatis,' very probably the true *engonatum* of Conrad, which he quotes; at the same time quoting the two different shells above named (one of them under two names, *P. spicata* and *P. spirata*), and figuring a very different shell, not angulated at all. To mere learners, like the author of the present paper, such differences are exceedingly perplexing." Under *Monoceros brevidens* Conrad he says: "The exact date of Sowerby's species, which is generally referred to *P. engonata* of Conrad, but differs from the figure of that shell, and agrees much better with the description of this, is difficult to determine. The volume bears the date 1841. It differs from *P. engonata* in being swollen at the base, with less sculpture and angulations." Finally, in regard to all three forms appears this: "The differences between the specimens of California *Monoceros* are so numerous, and similar specimens from other quarters are so variable, that the three species here repeated from Conrad are given with very great hesitation. That the forms figured by Sowerby and Reeve are conspecific, is by no means improbable; the form *engonata* is the most aberrant but it is by no means unapproached."

Later Dr. Carpenter evidently changed his mind to some extent in regard to the different forms, as in his Supplemental Report, 1863, p. 663, he lists three forms from the California coast, as follows:

Monoceros engonatum Conrad = *unicarinatum* Sowerby.

Brown-dotted, with sharp posterior keel, smoothish.

Monoceros ? var. *spiratum* (Blainv.). Light colored, sealy; horn not developed.

Monoceros lapilloides Conrad = *punctatum* Gray + *brevidens* Conr. Not shouldered, shape of *lapillus*.

For many years writers on California shells and the collectors

have been following Carpenter in the use of *engonatum* Conrad and *lapilloides* Conrad for the two common forms.

Spirata Blainville has been regarded as a variety of *engonata* Conrad by nearly all writers. Arnold mentions it in his Paleontology of San Pedro, p. 246, as follows: "Specimens showing the sealy surface of var. *spiratum* grade over into the smooth form; the sharp-keeled forms merge into those which approach very near to *M. lapilloides*. Some specimens have thin and smooth outer lips, while others are strongly dentate. Of fifty specimens from the San Pedro Pleistocene only three have the characteristic tooth developed, thus showing that in the earlier form this distinguishing character was only occasional. The sealy specimens are generally the strongest keeled. This later form is the var. *spiratum* of Blainville." Stearns, in the Am. Journ. Conch., vol. 7, 1872, applies the name of var. *spirata* Blainv. to a local form found at San Diego, while it is stated in Tryon's Man. Conch. that *spiratum* Blainville and *engonatum* Conrad are undoubtedly the same. If we are to take the light-colored sealy variety described by Carpenter and Arnold as the typical form for the species, the darker and smoother form which has so long been recognized as having at least a varietal difference should take the name of *Acanthina spirata* var. *engonata* Conrad, 1837.

It is pretty generally recognized that all gradations are to be found between the forms long known as *Monoceros engonata* and *Monoceros lapilloides*. Dr. Dall gives the date for Sowerby's *Monoceros punctulata* as 1835 and *Monoceros lapilloides* becomes *Acanthina spirata* var. *punctulata* Sowerby, 1835. It is the form found on the exposed rocks of the outer coast and under a different environment takes on a distinct form.

Another variety, *Acanthina spirata* var. *aurantia* Dall, was described in Proc. U. S. Nat. Mus., vol. 34, p. 248. This is a color form of variety *engonata* Conrad. Similar orange or lemon tinted specimens of quite a number of California shells have been given varietal names.

Acanthina paucilirata Stearns, 1871, was described from San Diego in Conch. Memo. No. 6, p. 1. The species is stated

by Lowe (*Nautilus*, vol. 27, p. 26) to be "In their prime" at Cape Colnette, Lower California. In general shape they are quite similar to small specimens of variety *punctulata* Sowerby but the color pattern is quite distinct. They are "externally painted with longitudinal broad black and narrow whitish streaks, interrupted by the white dental groove," thus cutting the black colored streaks up into large squares. In variety *punctulata* the light color predominates and the dark is reduced to small square dots. A large series recently collected near Laguna, Orange County, show markings intermediate between the two. It is quite probable that further collecting and study will show that *paucilirata* is only a southern form of variety *punctulata* and it will also have to be classed as a variety of *Acanthina spirata* Blainville.

The Lower California species *Acanthina lugubris* Sowerby, 1822, is reported from San Diego on the strength of a single specimen found there some years ago. Orcutt reports it quite common as far north as the International Boundary Line. It has been stated that *Acanthina paucilirata* Stearns forms the connecting link between *lugubris* and *engonata*. If further collecting along the northern portion of the coast of Lower California, where the ranges of the different forms overlap, shows the full series of intergrades, still further changes in the nomenclature will have to be made. In groups of this kind where the forms are so variable it is difficult to draw the line between variety and species, and the question of possible hybrids is always present.

MARINE SHELLS OF DRIER BAY, KNIGHT ISLAND, PRINCE WILLIAM SOUND, ALASKA.

BY WALTER EVERDAM

During the summer of 1923, while engaged at my trade as cooper in the herring saltery of the Knight Island Packing Co. in Drier Bay, Prince William Sound, I utilized much of my spare time in dredging and searching for shells along the beaches.

Drier Bay is about 35 miles by boat from La-Touche; it is an indentation of Knight Island, about 10 square miles in area. Steep mountains surround the bay, causing steep rocky beaches in most places and often fairly deep water in close to the shore. In Mallard Bay, Cat-head Bay and Miner's Cove, as well as several other coves and small bays belonging to Drier Bay proper, the beaches are covered with fucus and at low tide with abundance of eelgrass, and the water is quite shallow.

The best collecting was obtained by washing the roots and leaves of eelgrass, which often grew to the length of 12 feet. About a ton of eelgrass was washed in tubs and the mud screened and panned, after which the remaining débris and shells were carefully examined and separated, and many rare species of small shells were thus obtained.

Most of the Odostomias and several other small rare species were found among stones and sea-moss at low tide in Mallard Bay. About a dozen species of Chitons were found, some of them from a depth of 200 feet.

Dredging was rather poor considering the large amount of physical effort that was performed. About 150 hauls were made at depths of 10 to 40 fathoms. Most of the dredging was done near the herring dock by rowing out about 200 feet and dropping the dredge and then rowing back to tie the boat to a piling, after which I proceeded to haul in the dredge rope by hand. It was generally chockfull of rocks and débris and often weighed over 200 lbs. The results were not always gratifying considering the meager returns that I generally got, but whenever I found a new shell I would try again. Sometimes in the fall of the year when there was very little work to do in the shop I would spend most of a day out in a small rowboat dredging shells. Three times during the season I lost my whole dredging outfit in waters ranging from 35 to 200 feet in depth, but each time I succeeded, with patience and perseverance, to snag it up again.

Many rare small shells were dredged, including two new species: *Turbonilla (Pyrgolampros) eyerdami* (Bartsch) and *Puncturella eyerdami* (Dall), and twenty-six species were found beyond their geographical ranges.

Most of the shells were sent to Doctor Bartsch for identification, to whom I am greatly indebted.

The following shells, comprising 139 species, were collected in Drier Bay:

Nucula tenuis (Montagu). Scarce, in soft mud; dredged.

Leda fossa (Baird). Not common, in mud, mostly dead shells; dredged.

Leda minuta (Fabr.). Scarce, in mud; dredged.

Yoldia myalis (Couth.). 2 or 3, in soft mud; dredged.

Yoldia montereyensis (Dall). Rare, in soft mud; dredged.

Yoldia species. In soft mud, dead shells; dredged.

Chlamys hericeus (Gould). Fairly common on stony bottom.

Propeamius alaskense (Dall). Not uncommon; dredged.

Limatula subauriculata (Mont.). Quite common; 30 fathoms.

Monia macrochisma (Desh.). Common on rocks at low tide; very thin.

Mytilus californianus (Conrad). Rare, at low tide.

Mytilus edulis (Linn.). Very common.

Modiolus modiolus (Linn.). Very common.

Musculus niger (Gray). Rare; dredged.

Musculus vernicosus (Mild.). Very common on eelgrass to which it is attached by a byssus.

Crenella decussata (Mont.). Common on roots of eelgrass.

Thracia curta (Conrad). Rare, in fine mud; 25 fathoms.

Kennerlia bilirata (Conrad). Not common, fine mud.

Cuspidaria beringensis (Leech). One specimen.

Cuspidaria planetica (Dall). Two specimens, muddy. 25 fm.

Astarte alaskensis (Dall). Common; 10 to 40 fathoms.

Astarte rictocyma esquimalti (Baird). Common; dredged.

Venericardia crebricostata (Krause). Rare.

Thyasira gouldii (Philippi). Common; dredged.

Diplodonta aleutica (Dall). Under stones at low tide.

Parvilucina tenuisculpta (Cpr). Common; dredged.

Serripes groenlandicus (Gmelin). Rare; dredged.

Saxidomus giganteus (Desh.). Very common on sandy beaches.

Marcia kennedyi (Reeve). A few specimens; 20 fathoms.

- Marcia subdiaphana* (Cpr.). Rare; dredged.
- Protothaca staminea* (Conrad). Common on muddy, stony beaches.
- Psephidia lordi* (Baird). Not common; dredged.
- Macoma sitkana* (Dall). On muddy beaches.
- Macoma nasuta*. Muddy beaches.
- Macoma balthica* (Linn.). Very common on muddy beaches.
- Spisula (Polynyma) alaskana* (Dall). Rare on beach.
- Mya truncata* (Linn.). Not common, on muddy beach.
- Mya intermedia* (Dall). Fairly common on muddy beach; young.
- Saxicava arctica* (Linn.). Very common on old piles and submerged wood and also floating wood.
- Saxicava pholadis* (Linn.). Same habitat but less common.
- Bankia setacea* (Tryon). Destroys all wharves and wood in a few years.
- Cadulus hepburni* (Dall). Common below low tide mark.
- Acteocina calcitella* (Gould). Dredged; not common.
- Acteocina eximia* (Baird). Common on eelgrass roots.
- Retusa semen* (Reeve). Dredged frequently.
- Retusa harpa* (Dall). Dredged; not common.
- Haminoca olgae* (Dall). Very common on eelgrass.
- Lora quadra* (Dall). Dredged; two specimens.
- Lora mörchi* (Leche). Dredged; one specimen.
- Lora harpularia* (Couthony). Dredged; a few specimens.
- Lora solida* (Dall). Dredged; six specimens.
- Lora chiachiana* (Dall). Dredged; not uncommon.
- Lora rosea* (M. Sars.). Dredged; about a dozen specimens.
- Lora beckii* (Moller). One specimen.
- Admete couthouyi* (Jay). Dredged; quite common.
- Olivella boetica* (Cpr.). Dredged; one specimen.
- Searlesia dira* (Reeve). Very common on rocky beaches.
- Schizopyga mendica* (Gould). On beaches, not common.
- Tritonalia interfossa* (Cpr.). Dredged; not common.
- Neptunea tenuisculpta* (Cpr.). Rare, under stones at low tide.
- Thais lamellosa* (Gmelin). Very common on rocks at high tide mark.
- Thais lima* (Martyn). Common on rocks.

Thais emarginata (Deshayes). Common, rocks.

Melanella micans (Cpr.). Dredged; one specimen.

Turbonilla (Mormula) eschscholtzi (Dall & Bartsch). Rare.

Turbonilla (Pyrgolampros) eyerdami (Bartsch). 3 specimens.

New species. Dredged from 20 fathoms, shelly bottom.

Odostomia (Evalea) quadrae (Dall and Bartsch). Among stones on beach, rare.

Odostomia (Evalea) skidegatensis (Bartsch). Among stones.

Odostomia (Evalea) willetti (Bartsch). Among stones on beach.

Odostomia (Evalea) stephensae (Dall & Bartsch). Among stones on beach.

Odostomia (Amaura) sanjuanenses (Bartsch). Rare, among stones at low tide.

Odostomia (Amaura) talpa (Dall & Bartsch). Among stones at low tide.

Cypraeolina pyriformis (Cpr.). Fairly common on seaweeds at low tide in Mallard Bay.

Cerithiopsis charlottensis (Bartsch). Not common.

Cerithiopsis onealensis (Bartsch). One specimen.

Bittium (semibittium) vancouverense (Dall & Bartsch). Common at low tide.

Trichotropis cancellata (Hinds). Dredged; common.

Trichotropis insignis (Midd.). Dredged; common.

Michanellum oregonense (Bartsch). Dredged; not common.

Fartulum occidentale (Bartsch). Dredged; not common.

Tachyrhynchus erosus major (Dall). Dredged; common.

Tachyrhynchus lacteolus (Cpr.). Dredged; not common.

Littorina sitchana (Philippi). Very common on rocks.

Littorina rufa (Donovan). Very common on rocks.

Littorina scutulata (Gould). Common on rocks.

Lacuna divaricata (Fabr.). Very common on eelgrass.

Lacuna sp. On eelgrass.

Cingula aleutica (Dall). On eelgrass; six specimens.

Alvania reticulata (Cpr.). Common on eelgrass roots.

Crepidula lingulata (Gould). Not common; dredged.

Crepidula nummarius (Gould). Dredged; not common.

Natica (Cryptonatica) aleutica (Dall). Dredged; common.

- Natica (Euspira) pallida* (Brod. & Sowb.). Dredged; not common.
- Natica (Euspira) monterona* (Dall). Dredged; one specimen.
- Velutina laevigata* (Linn.). A few specimens from stones.
- Lepeta concentrica* (Midd.). Common at low tide on rocks.
- Lepeta caecoides* (Cpr.). Common at low tide under stones.
- Acmaea nitra* (Esch.). Two specimens.
- Acmaea cassis pelta* (Esch.). Common.
- Acmaea scutum* (Esch.). Not common.
- Acmaea peramabilis* (Dall). Three young specimens.
- Cidurina cidaris* (A. Adams). Three specimens, mud; 40 fm.
- Machaeroplax varicosus* (Mighels & Adams). Dredged; one specimen.
- Pupillaria pupilla* (Gould). Very common at low tide.
- Pupillaria cinerea* (Couth.). Dredged; one specimen.
- Pupillaria pupilla*. Several varieties.
- Margarites helcinus* (Phipps). Very common on eelgrass.
- Margarites marginata* (Dall). Very common on eelgrass.
- Diadora aspera* (Esch.). Scarce, on rocks at low tide.
- Puncturella eyerdami* (Dall). *New species.* Three specimens.
25 fathoms.
- Puncturella galeata* (Gould). Dredged; not common.
- Puncturella cucullata* (Gould). Dredged; not common.
- Siphonaria thersites* (Cpr.). Common on fucus.
- Kellia laperousii* (Deshayes). Among stones on the beach.
- Hemithryx psittacea* (Lam.). Dredged; not common.
- Terebratalia transversa* (Sowb.). Dredged; not common.
- Laqueus californicus* (Koch). Dredged; young; common.
- Terebratulina unguicula* (Cpr.). Dredged; not common.
- Terebratalia caurina* (Gould). Dredged; common.
- Spirorbis* (*species*). Very common on fucus and eelgrass.
- Columbella (Nitidella) gouldii* (Cpr.). Dredged; 2 specimens.
- Rochefortia tumida* (Cpr.). On eelgrass.
- Turtonia minuta* (Fabr.). On eelgrass.
- Cryptomya californica* (Conrad). Dredged; two specimens.
- Cyllichnella alba* (Brown). Dredged; not common.
- Argobuccinum oregonense* (Redf.). Only one mature specimen. This species is very abundant in some parts of Prince William Sound.

- Buccinum morchianum* (Fischer). Common under rocks.
Trachydermon ruber (Linn.). Dredged; not common.
Trachydermon albus (Linn.). Dredged; not common.
Trachydermon (Cyanoplax) hartwegii (Cpr.). Under stones.
Tonicella submarmorata (Midd.). Dredged; common.
Ischnochiton interstinctus (Gould). Dredged; common.
Ischnochiton (Trioplax) trifidus (Cpr.). Dredged; rare.
Mopalia sinuata (Cpr.). Dredged; rare.
Katherina tunicata (Wood). On rocks; scarce.
Mopalia (ciliata) wossnessenskii (Midd.). Under rocks; not common.
Tonicella lincata (Wood). Under stones; common.
Mopalia muscosa (Gould). Under stones.
Cryptochiton stelleri (Midd.). On rocks; not common.

Besides the above list of 141 species, about 50 other species of invertebrates were collected. Among these are some very rare starfishes and crustaceans. Two very rare crabs, *Chiocnectes bairdi* (Rathbun) and *Pinnixa schmitti* (Rathbun), were retained by the U. S. Nat. Museum, and also a number of a new species of *Bryozoa*, *Discocylis* (Bassler), the last species being the first of its kind from Alaskan waters.

Two land shells were found, being fairly common in one place under old boards and building paper—*Polygyra columbiana* (Lea) and *Circinaria sportella* (Gould).

SOME UNPUBLISHED PLATES OF CONRAD'S "UNIONIDAE".

BY WILLIAM J. FOX

Academy of Natural Sciences of Philadelphia

The abrupt ending (with the incomplete word beauti- on page 118) of the work "Monography of the Family Unionidae, or Naiades of Lamarek, . . . ,'' by T. A. Conrad, Philadelphia, 1836 [1835-1840], indicated that further parts were then contemplated. In all, thirteen appeared, with five plates each, a total of sixty-five plates.

The work was presumably discontinued on account of illness and lack of financial support (see *Popular Science Monthly*, XLVII, p. 260, 1895); and it is interesting to note that the library of the Academy of Natural Sciences of Philadelphia has just come into possession of seven unpublished plates. These were obtained, with a miscellaneous lot of natural history pamphlets, from a second-hand book store in Philadelphia about twenty-five years ago, and have remained unnoticed until their donation to the Academy. They are inscribed in lead pencil by Conrad as follows: *Unio ligamentina* ? Lam., pl. 69; *Unio infucatus* Conrad, pl. 70; *Unio nasutus* Say, pl. 71; *Unio Jayanus* Lea [the name *Jayanus* crossed out and *Jayensis* substituted], pl. 72; *U. verucosus* Raf., pl. 73; *U. Tuberculatus* Raf., pl. 76; and a plate, with no inscription, containing three figures of what is known to modern systematists as *Quadrula cylindrica* Say.

These plates are colored lithographs, and are on a paper differing in quality from that used in the book as issued; it would seem that they are the lithographer's proofs, colored as samples to follow. There is also a proof copy of *U. plicatus* Say, pl. 65, which is the last plate in the book as published.

If the parts intended to follow No. 13 were to have five plates each, as in the preceding numbers, it would indicate that we have here part of the plates for Numbers 14, 15 and 16.

The plate 72 is inscribed (also in lead pencil) C. A. P. jr. del., which suggests the name of the artist, Charles Poulson, Jr., who was elected a member of the Philadelphia Academy in 1841, and was no doubt a relative (son perhaps) of Charles A. Poulson, to whom Conrad's book is dedicated. It has been taken for granted that Conrad himself was the delineator of these illustrations.

DR. NELSON ANNANDALE.

The death of Dr. Annandale, Director of the Zoological Survey of India, in Calcutta on April 10, at the age of forty-eight, is a severe loss to science. Dr. Annandale became Deputy Superintendent of the Indian Museum in 1904. Two years later he was elected Superintendent. Annandale at one time or another worked on most groups of animals. He became known as an authority on freshwater sponges, polyzoa, etc., and on stalked barnacles, also publishing on fishes, reptiles and insects. In the last few years he worked with great industry and genius on freshwater mollusks, his papers covering a wide field, from Mesopotamia to Japan, and quite transforming this branch of Indian zoology. Most of these studies were published in the *Records of the Indian Museum*, Calcutta.

HENRY HAVERSHAM GODWIN-AUSTEN.

Lieutenant-Colonel Godwin-Austen died on December 2nd last, in his ninetieth year. He went to India in 1851 as a subaltern in the 24th Foot, but after six years' service, joined the Indian Survey Department as topographical assistant. He was the pioneer explorer of the great mountain ranges of Baltistan, north of the Indus and Kashmir, and fixed the position of the second highest mountain in the world, subsequently named Mount Godwin-Austen. He carried out much survey work in the northeastern hill regions, bordering Assam. During this service Godwin-Austen collected birds, upon which he published many papers, and land snails, upon which he finally specialized. Besides many papers on mollusks in periodicals, he published *The Land and Freshwater Mollusca of India*, an epoch-making work on Indian land mollusks, also indispensable in the study of all Oriental and Ethiopian faunas. The various groups of Zonitidae and the land operculates especially were worked out with great acumen and illustrated profusely with his own drawings. He also con-

tributed the volume on *Testacellidæ* and *Zonitidæ* in *The Fauna of British India*.

He retired from the Survey in 1877 and spent the last forty years at Nore, near Godalming, England.

"Of a most attractive disposition and singular charm of manner, Godwin-Austen was much beloved by his contemporaries, most of whom he long outlived."¹

W. H. GOLISCH.

California collectors have been greatly saddened by the death of William H. Golisch, which took place in his 54th year at his home in Los Angeles, April 18th, 1924. Mr. Golisch had always been of a frail constitution and for the past three years had found his activities increasingly limited by physical weakness. About eight years ago he and his wife gave the large conchological collection which bears their name to the Southwest Museum, and since that date much of their time and strength have been devoted to so installing and arranging their shells that they might be both a pleasure to the hundreds of casual visitors to the Museum and a help and satisfaction to students. That they were succeeding is the testimony of those who have had an opportunity to compare their collection with those in other cities.

Mrs. Golisch expects to continue the work which her husband was obliged to leave unfinished, feeling that there could be no better memorial to this beloved collector than the completion of the work which he loved and began.

To say that Mr. Golisch was a man of high Christian character, holding both the respect and affection of all who knew him, is perhaps superfluous, but those who have been associated with him for so long are unwilling to pass over this last opportunity to pay tribute to his personality and to his achievements in spreading conchological knowledge and interest.—SOUTHWEST MUSEUM CONCHOLOGICAL CLUB.

¹ A fuller sketch of Godwin-Austen's life, with portrait, may be found in *The Ibis*, for April, 1924.

NOTES

COQUINA BOUILLON.—When at Daytona, Florida, a man remarked in the course of conversation that coquina made a delicious soup. Having lived for several years at St. Augustine, Florida, where coquina was a term applied only to the shell-rock, of which Fort Marion and some of the older houses are built, the recipe sounded far from appetizing. I had heard of bouillon made from *Donax variabilis*, and this was really what the man meant, for he said they were tiny clams, found very abundantly on the ocean beach at low tide. On my return I looked into the matter and found that the Spanish word *coquina* means shell-fish in general, with no reference to the shell-rock. Therefore the use of the word for the shell-rock at St. Augustine and other parts of Florida is purely a local term. On the other hand, the word *Donax* has, for one of its meanings, a kind of shell-fish.

There was an old man of Daytona
Who said they made soup of coquina
It gave us a shock
When we thought of the rock
Then we learned that *Donax* was coquina.—C. W. J.

MARGARITANA MARGARITIFERA LINNE IN LABRADOR.—From Rev. W. W. Perrett of the Moravian Mission in Hopedale in Labrador I duly received a number of *Margaritana margaritifera* L., found in a river in the neighborhood of Hopedale. The specimens are of the common type; the biggest shell is 120 mm. in length. I think this is the first record for Labrador. Hopedale is situated in 55° 5' N. lat., 60° W. long.—HANS SCHLESCH, Copenhagen.

A LARGE PECTEN BED.—It may be of interest to the readers of the NAUTILUS to learn of the recent discovery of a bed of *Pecten magellanicus* (Gmel.) from which fishermen with flounder dredges are taking hundreds of barrels a day. The locality is about ten miles northeast of Race Point, Cape Cod, on the eastern edge of Stillwagen's Bank, in about 20 fathoms.

The fishermen say the bed is less than a mile square but the shells are so plentiful they are obliged to tie up a part of the net to prevent getting too many at one haul, dragging only ten or fifteen minutes. Two specimens sent me measured 6½ inches each, and were from a lot of 100 barrels, taken by one boat that day. One barrelful in the shell yields about two gallons of "eyes," as the fishermen call them, the so-called eyes being the adductor muscle. These they sell for \$3 per gallon. There are some twenty boats engaged in this industry. They get from 50 to 150 bbls. a day, and at this rate must soon exhaust the supply. This is the first large bed of *P. magellanicus* discovered north of Cape Cod, although beds of this species are found south of Cape Cod, even as far as off the coast of New Jersey. Single specimens are often pulled up on fishing lines along the coast, indicating beds not yet exploited.—J. HENRY BLAKE.

THE VARIETAL NAMES OF *POLYGYRA PROFUNDA* (Say).—In 1899 (*Terr. Moll. Mich.*, p. 12) I described the form of this species without bands as "var. *alba*" and incidentally referred to the form with coalescent bands as var. "unicolor".

In 1876 Walker & Beecher (*Proc. Ann Arbor Sei. Ass.*, p. 44) listed without description a "*Helix multilineata* var. *albina*". . .

In 1878 Witter (*Quar. Jour. Conch.*, I, p. 384) described the bandless form of *multilineata* as "var. *alba*". Walker & Beecher's "*albina*" being without any description was a mere "*nomen nudum*" and cannot be recognized. Witter's designation is therefore entitled to stand.

Under these circumstances my use of "*alba*" as a varietal name for *P. profunda* was invalid and I would therefore propose for the bandless form of that species the varietal name of *efasciata*.

In 1868 Currier (*Shell-bearing Moll. Mich.*, p. 5) and in 1881 DeCamp (*Shell-bearing Moll. Mich.*, p. 6) listed "*Mesodon multilineata unicolor*," and in 1894 (*Rev. Moll. Fauna Mich.*, p. 16) I catalogued a "*Polygyra multilineata unicolor*." In none of these papers was there any description of the form

thus designated, and being nude names they cannot be held to prevent the subsequent use of "unicolor" as a varietal name in *Polygyra*. It follows therefore that *Polygyra profunda unicolor* is entitled to stand as the name for the form of that species with coalescent bands.—BRYANT WALKER.

PUBLICATIONS RECEIVED.

NOTES ON SOME AUSTRALIAN CASSIS. By C. Hedley. (Records Australian Museum, vol. 14, pp. 46-48, pl. 8, 1923.)

ON A THALASSOID ELEMENT IN THE AUSTRALIAN MOLLUSCAN FAUNA. By C. Hedley. communicated by C. Oke. (Victorian Natur., vol. 40, pp. 75-77, 1923.)

STUDIES ON AUSTRALIAN MOLLUSCA, PT. 14. By C. Hedley. (Proc. Linn. Soc. N. S. Wales, vol. 48, pp. 301-316, pl. 30-33, Oct. 1923.) Three new species are described, with beautiful illustrations of *Umbraculum botanicum* n. sp. and *Tethys angasi* Sowerby.

GYMNO SOMATOUS PTEROPODA FROM FRIDAY HARBOR, WASHINGTON. By H. P. K. Agersborg. (Ann. Sci. Nat. Zool., 10 ser., VI, pp. 391-401, 1923.) Two new species are described.

THE MORPHOLOGY OF THE NUDIBRANCHIATE MOLLUSC *MELIBE LEONINA* (GOULD). By H. P. K. Agersborg. (Quart. Journ. Micr. Sci., vol. 67, pp. 507-592, Dec. 1923.) A very exhaustive treatise of this interesting nudibranch, proving that *Chiarra Gould* is a synonym of *Melibe* Rang.

NEW PEARLY FRESH-WATER MUSSELS FROM MEXICO AND URUGUAY. By Wm. B. Marshall. (Proc. U. S. Nat. Mus., vol. 63, pp. 1-4, pls. 1-3, 1923.)

TERtiARY MOLLUSKS OF THE GENUS ORTHAULAX FROM THE REPUBLIC OF HAITI, PORTO RICO AND CUBA. By Wendell R. Woodring. (Proc. U. S. Nat. Mus., vol. 64, pp. 1-12, pls. 1-2, 1923.)

TWO NEW FRESHWATER SNAILS FROM MICHIGAN. By Mina L. Winslow. (Occlus. Paper Mus. Zool., Univ. Mich., no. 145, pp. 1-4, pl. 1, Dec. 1923.)

NEW MOLLUSCAN NAMES. By Truman H. Aldrich. (Proc. Biol. Soc. Wash., vol. 36, p. 199, Dec. 1923.) *Cyprea malayi* n. n. for *C. dalli* Aldr. 1894, not Cossmann 1893, and *Cyprea comithi* n. n. for *C. smithi* Aldr. 1886, not Sowerby 1851.

TWO NEW SANTO DOMINGAN LAND SHELLS. By E. G. Vanzatta. (Proc. Acad. Nat. Sci. Phila., vol. 75, pp. 359, 360, 1923.)

NOTES ON MOLLUSCAN NOMENCLATURE. By W. H. Dell. (Proc. Biol. Soc. Wash., vol. 37, pp. 87-90, Feb. 1924.)

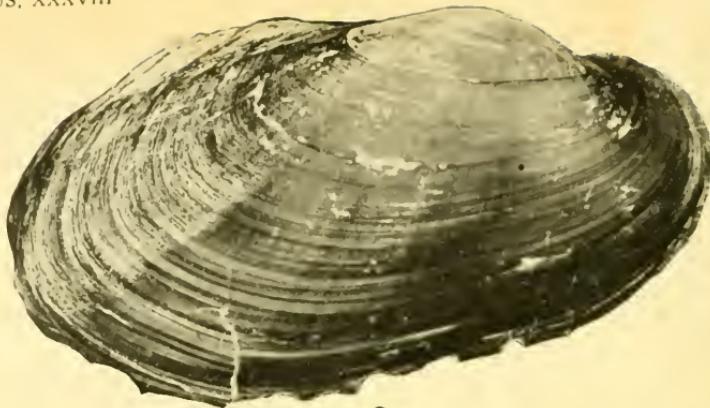
THE ATTACHMENT OF OYSTER LARVE. By Thurlow C. Nelson. (Biological Bulletin, March, 1924, p. 143.) The following summary is given: "Full-grown larvae of the oyster shortly before attachment move over an appreciable area of solid surface, testing it out with the foot. Actual attachment is preceded by circling movements, the larva finally coming to rest with the left valve held in contact with the substratum by the foot. The suggestion of Stafford, 1913, that the foot is the organ of attachment has been confirmed by direct observation. The use of the foot and of the mantle during fixation is here described. The circling movements of the larva while crawling over a substratum not only aid it in obtaining a favorable foothold, but probably are also instrumental in producing a fairly even distribution of the spat."

FOSILLIUM CATALOGUS. I, Anizalia, editus C. Diener. Gastropoda extramarina tertiaria. 1923. In 6 parts, pp. 1-62. By W. Wenz. The literature of fossil non-marine mollusks is so widely scattered that great labor is required to learn what is published on the Tertiary history of any family or genus. There has been no general guide to the subject since Sandberger's monumental work, now about fifty years old. In the *Fossilium Catalogus* the references and synonymy of each species are given in full, with its horizon and localities. How-

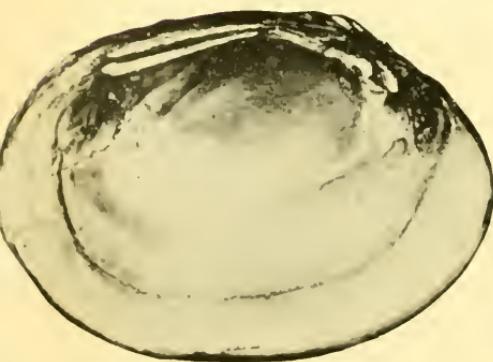
ever, it is far from being a mere compilation of names; only those acquainted with the subject will recognize how much excellent work has been done in the synonymy, in modernizing the classification and in correcting generic references. Dr. Wenz was well equipped for the task by his previous studies on the same subject, and we congratulate him on the completion of this standard work, which will be of value not only to palaeontologists, but also to all interested in non-marine mollusks.—H. A. P.

LAND MOLLUSCA FROM THE SOLOMON ISLANDS. By William F. Clapp. (Bull. Mus. Comp. Zool., Cambridge, LXI, No. 11.) 1923. Based upon specimens collected by Dr. W. M. Mann. About half of the 48 species found proved to be new. Among the novelties are three species of *Placostylus*, several *Crystallopsis*, *Trochomorpha*, etc. Perhaps the most interesting is the snail for which the new genus *Cryptaegis* is proposed. The large, thin, subglobose shell is completely covered by the mantle, which is concrecent over it. It is regarded as a highly specialized offshoot of *Papuina* or some closely related genus. In many cases anatomical details are described and figured, and there are five excellent plates of the shells.—H. A. P.

MR. CHARLES HEDLEY has resigned his position as Principal Keeper of Collections, Australian Museum, after thirty years' service. He has been appointed Scientific Director of the Great Barrier Reef Committee, a body formed under the auspices of the Royal Geographical Society of Australasia, Queensland Branch, to engage upon research problems in relation to that great natural feature of the Queensland coast. Mr. Hedley has also been recently elected an Honorary Fellow of the New Zealand Institute.—*Australian Zoologist*.



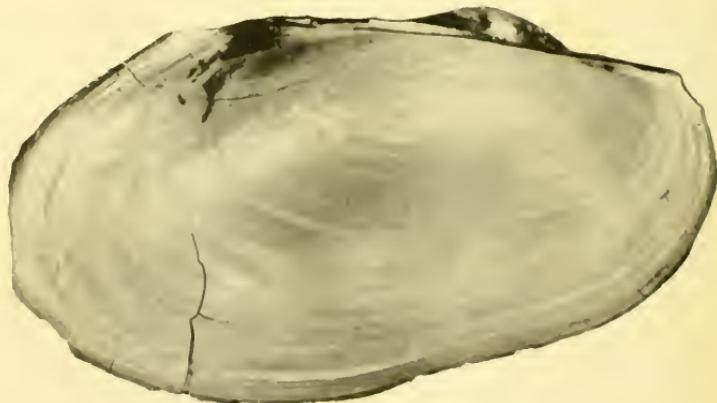
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1



2



4

1, 2. NEPHRONAIAS ELVAE WALKER
3, 4. ANODONTITES FLECKI WALKER

THE NAUTILUS.

Vol. XXXVIII

OCTOBER, 1924.

No. 2

ON THE RIO GRANDE

BY JAMES H. FERRISS

In the last days of February, this year, snow-balling led all Texan sports in the Pecos-Rio Grande region. To the native-born it was their first snow — thus a warm game and full teams. Occasionally the banks were too deep for the Fords. At Alpine, however, by the time our car had been refreshed and tried out, the roads were open, and for the next two months the weather-man was kind and genial, from the Big Bend to the northeastern corner of Texas.

This was an expedition of only one. Mollusks, caeti and ferns were the real purpose; pleasure, health, and a few other things merely incidental. Eleven rattlesnakes were included in these incidental features, and some good things botanical for a public park collection. The journey from Alpine to Terlingua, in the depths of the Big Bend of the Rio Grande, was over the route scratched by Dr. Pilsbry and the present writer in a former (1922) expedition, an account of which we have in preparation. No investigations were made this time until new ground was invaded southwest of Terlingua. Here the bones of *Bulimulus alternatus hesperius* were very plentiful in the sands of a low plain frequently and recently flooded; in its nakedness quite another Death Valley.

In the north slope of a mountain which to the south forms

the north wall of the Grand Canyon of the Rio Grande, dwells one of the larger *Holospiras*. Sad to relate, that particular catch was lost in the mail, thus not identified. Again *Bulimulus a. hesperius* was collected in the brush of the south wall of the river at Langtry, and upon the higher plains of the Pecos.

Eastward from Marathon (on the Southern Pacific R. R.) the El Paso-San Antonio highway, for sixty or seventy miles, is confined to an ancient valley or channel between ranges of low mountains, and thus one of the most pleasing prospects. It was only twenty to forty minutes from car to mountain-top. Twenty live *Lysinoes* in one gulch, the very one the collectors have been searching for for some forty years, because a "bone" had been found near a prairie-dog hole at Alpine. *Holospira*, *Bulimulus*, and ferns were plentiful.

At Sanderson, in this valley, *Polygyra* and *Helicina* broke in, and continued the remainder of the journey. At the mouth of the Pecos *Euglandina* was abundant (and dead). Only two living ones were found in three half-days of especial digging. While gathering other shells, the dwelling place of this member of a wet-land fauna was accidentally discovered in the highest and driest hills. Where the upper layer of limestone is separated from the main floor one or two feet, the space filled with broken stone, soil and rubbish, will be found the home of *Euglandina singleyana*. No bones or fragments of this species were scattered about the surface with the remains of other species, and the shells in their home were unbroken. Thus evidently the animal is not toothsome for mice or the rock cat. Death comes in the natural way. The live shells, agate-yellow in color, polished, transparent, with faultless lines of mollusean architecture, a full-grown specimen lightens the heart, bestirs the energy, of the collector.

Both Pilsbry and I had a profitable experience here at the Pecos' mouth in 1903. The limestone bluffs, around five hundred feet above the river bed, present an excellent elevation for rarities in conchology and botany. Here also a close acquaintance with our largest rattlesnake was enjoyed. *Notholæna schaffneri*, one of the rarest American ferns, thrives

here under the upper, overhanging sheets of limestone. A delicate plant, it prospers best in the fine dust accumulating upon the floor of its cave-like home. Posing upon a common level with his victims, the collector upon hands and knees crawls about in the cacti and prickly brush with becoming humility and caution. Thus came about this introduction to a rattler of seven inches girth. Happily, although the rattler was coiled for emergencies and, nose and nose, we were less than two feet apart, his snakeship was exceedingly fat, thus good-natured and patient. However, to get him permanently into an army knapsack required the better part of an hour's diplomacy. It was worth it. With this, my collection contains all of the American poisonous snakes except three.

A warm shower in the middle of April was a grand spring opening for the *Bulimulus* tribe. Then *B. alternatus hesperius* climbed the fence-posts of the Pecos, the cacti and the brush. Some of the shrubbery looked like stands of the white snowberry in fruit. A few days later *B. dealbatus pecosensis* appeared at the High Bridge, and during the remainder of the journey *Bulimulus* bushes were in full fruit, all species of the region being represented. While the highway from the Pecos River is fairly level for southern Texas, on into Waco, and one brushy tract like another, each collecting ground contained a *Bulimulus* species, variety or color unlike its predecessor.

A mile perhaps below the Laguna post-office the hills upon the south bank of the Nueces, high and well timbered, with precipices and slides, seemed to warrant a little wading. *Cheilanthes leucopoda*, another of the rarest ferns, had been found within a hundred miles or so of that beautiful scenery. In fact, since returning home, the original discovery of the species was found to be Uvalde Canyon, a familiar name in that part of Texas. Not only this fern thrives in that particular Nueces bluff, but also *Anemia mexicana*, another Texas rarity in ferns; also the recently described *Holospira goldfussi anacachensis* Bartsch; and three species of cacti heretofore unknown to me.

Possibly in the headwaters of the Neuces and the low range of mountains from New Braunfels, Fredericksburg and Keer-

ville, with a western terminus somewhere near the Pecos drainage, both botany and conchology may contain something of great interest. The Great Bend of the Rio Grande also seems tempting. Our two raids there scratched the west side of the Chisos mountains, and a sight-seeing trip to the Grand Canyon only. The region is as accessible as any, considering desert conditions. From Marfa, Alpine and Marathon via Terlingua to the river is about seventy miles. From the Pecos to Marfa a little over two hundred miles. From Marfa to El Paso another two hundred. Here are mountains 9000 feet in altitude, and desert conditions quite unlike other better known deserts. Limestone almost everywhere, the soil fertile, well covered with vegetation; population American stock-men and Mexican gardeners; a few villages and quicksilver mines. With a Ford or pack train is not this about the best of our unexplored regions?

In the following list only the species taken in the Big Bend and along the highroad (which roughly parallels the Southern Pacific Railway) as far east as the Nueces River are recorded. The few lots taken in central Texas are from well-known places.

LIST OF SPECIES, BY H. A. PILSBRY AND J. H. FERRISS.

Polygyra texiana texensis (Pils.). Alpine, Langtry, mouth of the Pecos, Devil's River, east of Brackettville and on the Nueces River. In the western counties this form, which is smoothish on the upper surface as well as the base, replaces the typical *P. texiana*, which is ribbed above. It was first described as *P. texensis* Pilsbry, Nautilus XVI, p. 31; later we found a smaller and even smoother form in the Devil's River region, which we described as *P. texiana hyperolia*, Proc. A. N. S. Phila., 1906, p. 128. The large series taken this year shows intergrades in size, sculpture and size of umbilicus between these forms, which cause us to unite them.

Thysanophora hornii (Gabb). Devil's River and Nueces River; scarce in the drift.

Bulimulus alternatus hesperius, n. subsp. (*Bulimulus alter-*

natus maria, Western Form, Pilsbry and Ferriss, Proc. A. N. S. Phila., 1906, p. 140, pl. 7, figs. 1-12; p. 132, fig. 5A.)

The shell averages larger than *B. a. maria*; spire more strictly conic; white or pale brown, uniform or with brown streaks which are never ragged; aperture very dark; columella not toothed. Length 30 to 44 mm.

In working over our collection of the expedition of 1903 the characters of this race were noted, but we did not then name it as separate from *maria*. A considerable amount of additional material from localities mentioned below, and larger series of the true *maria* from the lower Rio Grande valley, collected by one of us, serve to emphasize the constant differences between the form of the high western country and *maria* of the lower valley. We take as type of *hesperius* a specimen from the east side of the Pecos at the High Bridge, measuring 34 mm. long, 17.4 mm. diameter. Additional localities of 1924 are: a valley just north of the canyon of the Rio Grande, W. of S. from Terlingua; Langtry; west of and at the highway bridge over the Pecos, near its mouth.

Bulimulus dealbatus pecosensis P. & F. Quite abundant, and variable in shape and color. Mouth of the Pecos in several places, and about halfway between there and Del Rio; near, west of, the Nueces River below junction of two dry branches, and in the river drift.

Bulimulus dealbatus ragsdalei Pils. Alpine, Housetop Mt., Sanderson, small hills west of St. John ranch, Langtry, Devil's River, and about 3 miles east of Del Rio.

Locally variable in shape and degree of striation; in some cases approaching *B. d. pecosensis*. Sometimes very small, down to 16 mm. long.

Bulimulus, n. sp. A peculiar rather long *Bulimulus*, very smooth and glossy, brown with many whitish streaks, was taken at Sanderson, but the single example is broken, and just what its characters are remains uncertain. It must be looked for again.

Holospira goldfussi anacachensis Bartsch. Nueces River.

Oeeurs both larger and smaller than the measurements given in the original account; from 10.7 x 3.5 mm. to 15 x 3.9 mm.

Holospira roemeri (Pfr.). Alpine and Housetop Mt., slender specimens; mouth of the Pecos; Devil's River; Nueces River. Specimens from the mouth of the Pecos measure:

Length 14, diam. 4.3 mm. Length 17.7, diam. 3 mm.

And from the Nueces River:

Length 12.5, diam 5 mm. Length 14, diam. 4 mm.

Length 12.7, diam. 4.9 mm. Length 18, diam. 4.3 mm.

Length 13, diam. 4.6 mm.

The longest of these is strictly cylindrie; the shortest is widest in the middle, while the others are widest in the upper part.

Euglandina singleyana (W. G. B.). Found on both sides of the Pecos, near the highway (see above). One broken specimen measures 20.3 mm. in diameter, and a fragment indicates a still larger size, thus surpassing the central Texas specimens.

Helicodiscus eigenmanni Pils. Drift of the Pecos, Devil's and Nueces Rivers.

Punctum pygmæum (Drap.). Nueces River.

Polita indentata umbilicata Ckll. Pecos, Devil's and Nueces.

Polita dalliana roemeri (Pils. & Ferr.). Nueces drift.

Pseudohyalina minuscula (Binn.), *P. singleyana* (Pils.) and *P. nummus* (Van.). Devil's and Nueces drift.

Euconulus chersinus trochulus (Reinh.). Devil's and Nueces river drift.

Succinea luteola Gld. Alpine, Langtry, mouth of the Pecos and Devil's Rivers.

Succinea avara Say. Devil's and Nueces Rivers.

Gastrocopta contracta (Say). Devil's and Nueces Rivers.

G. pentodon (Say). Nueces River.

G. pellucida hordeacella (Pils.) and *G. cristata* (P. & V.). Pecos, Devil's and Nueces drift.

Pupoides marginata (Say). Same localities.

Vertigo ovata (Say). Nueces drift, one specimen.

Vallonia perspectiva Sterki. Pecos, Devil's and Nueces drift.
Lymnaea (Galba) parva Lea. Devil's and Nueces Rivers.
Planorbis trivolvis Say and *P. antrosus* Con. Nueces River.
Planorbis dilatatus Gld. Nueces drift.
Planorbis carus Pils. & Ferr. Devil's and Nueces drift.
Planorbis liebmanni Dkr. Pecos, Devil's and Nueces drift.
Planorbula obstructa (Morel.). Same localities.
Physa sp. Pecos and Nueces Rivers; small specimens only.
Paludestrina protea (Gld.) and *P. seemanni* (Feld.). Nueces drift.

Cochliopa riograndensis Pils. & Ferr. Pecos and Nueces Rivers.

Helicina orbiculata tropica Pfr. Pecos, Devil's and Nueces drift; also east of Brackettville.

SOME OLD PLEUROCERIDS AND A NEW ONE

BY CALVIN GOODRICH

In the summer of 1923 Mr. W. J. Clench and Mr. L. E. Wehmeyer made a collecting trip by automobile that began at Ann Arbor, Mich., and took in parts of Indiana, Illinois, Missouri, Arkansas, Tennessee, Mississippi, Alabama and Florida. The Pleuroceridæ taken on the journey — described by the travelers as the Voyage of the Asthma — were placed in my hands for identification.

GONIOBASIS LIVESCENS (Menke). Wabash River, Ind., two miles west of Huntington, also two miles west of Peru; Pipe Creek, seven miles west of Peru.

This is a stout, bulbous form, varying little in the upper Wabash drainage. I have it from the Wabash, Logansport; Little Wabash, Huntington; Salamanie, Montpelier; Eel, North Manchester; Tippecanoe, Warsaw; Deer Creek, near Delphi; Coal Creek, Veedersburg. This is on a line running southwest across Indiana. The form is the common one of the Maumee River system of Lake Erie and occurs in the Raisin, Huron and Clinton rivers of eastern Michigan; also in

the more protected parts of the Niagara River and in several of the streams of Ontario. The form is noticeably different from the species in Lake Erie, the type locality of *livescens*.

Anthony described a melanian from the Wabash as *M. cubicoides*.¹ Material from Huntington was identified by Call² as this species. The types, which I have examined, are two specimens sharply angled on the body whorl. I am sure that as regards *livescens* of the streams this is only an oddity, rare and of no specific value. However, in Lake Erie are deep-water forms that are carinate to the last whorl, the character being constant. Such shells were dredged a few years ago by students of the Ohio Biological Station at Put-in-Bay and there is a beach in Ottawa County, Ohio, upon which these carinated forms are thrown, doubtless by the severer storms. Call says he did not find *cubicoides* (*livescens*) in the Wabash below Lafayette. It is rather strange that Daniels, who collected several times at Lafayette, did not find any Goniobases there at all.

Other synonyms of *livescens*, whose types I have examined, are:

- Melania niagarensis* Lea, March, 1841.
Melania napella Anth., Dec., 1850.
Melania cuspidata Anth., Dec., 1850.
Melania elata Anth., Dec., 1850.
Melania occulta Anth., Feb., 1860.
Goniobasis milesii Lea, June, 1863.
Goniobasis lithasiodes Lea, June, 1863.

PLEUROCERA ACUTA Raf., Wabash River, two miles west of Huntington, Ind.; Pipe Creek, seven miles west of Peru, Ind.

This is a common associate of *Goniobasis livescens* in northern waters, though apparently it does not go as far north as *livescens*. Call speaks of finding this species (commonly known as *P. subulare* Lea) by thousands at Lafayette "on the muddy banks of the river within the city limits." It is a large form here and specimens taken by Daniels were sent

¹ Proc. Acad. Nat. Sci., Phila., Feb., 1860, p. 60.

² Indiana Geological Report for 1899, p. 432.

out as *elevatum* Say. There is some question as to what the true *elevatum* is inasmuch as Say himself appears to point out its resemblance to *canaliculatum*. This would read most of the *elevatum* out of the cabinets. A complex of Pleuroceridae occurs at Lafayette. It is extremely difficult to tell where *acuta* leaves off and forms of the *canaliculatum-undulatum* group begin. Possibilities are hybridism and a merging of species hitherto unsuspected.

GONIOBASIS POTOSIENSIS (Lea), stream three miles south and a second stream four miles south of Potosi, Washington County, Mo.; creek two miles west of Shepard, Iron County, Mo. All three localities in the drainage of the Meramec River.

Nearly all the specimens taken are juvenile, but agree with Lea's meager description and one individual has exactly the measurements set down for the types. The species is close to *plebeius* Anth., common in the Ozarkian region, differing from it principally in having a much more delicate texture, in being deeply and constantly carinate and in having the outer lip regularly rounded with no angulation whatever. Even quite old specimens would probably be less heavy than the average *plebeius*. A possible synonym is *Goniobasis ozarkensis* Call, 1886.

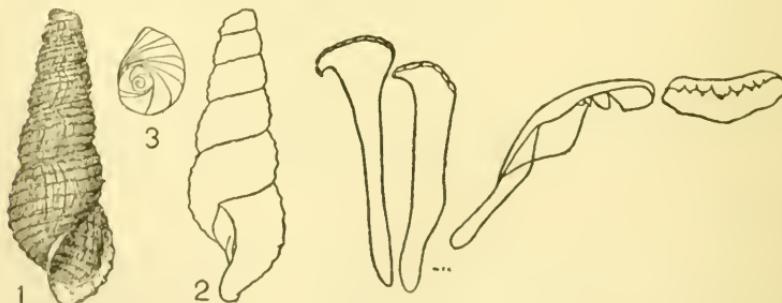
GONIOBASIS PLEBEIUS (Anth.), two miles southwest of Houston, Texas County, Mo. (Gasconade River drainage); two miles southeast of Hardy, Sharp County, Ark. (White River drainage).

These forms are identical with those taken by Call, Hinkley and Brown in the same region. The "center of population" of this species appears to be in Missouri, south of the Missouri River. It is plentiful in northern Arkansas, and there apparently it reaches its largest growth. Certain *Goniobasis* from Des Moines, Iowa, may be assigned to *plebeius*. Dr. Bryant Walker has specimens from Fort Hill, 18 miles south of Ft. Gibson, Indian Territory. This would be in Muskogee County, Okla., the drainage of the Arkansas River. I take the types of *Melania haleiana* Lea, coming from Alexandria, La., and now in the National Museum, to be young *Pleurocera acuta*.

Raf. But with this type lot are some juvenile *Goniobases*, almost indeterminate but nearer to *plebeius* than to anything else. If they are this species, the range of *plebeius* is from Iowa to Louisiana, westward into Oklahoma and probably into Kansas.

GONIOBASIS CLENCHI, new species.

Shell: Elongate, rather thin, Dresden-brown to chestnut-brown, the type without color bands. Sutures deeply impressed. Apex eroded. The first of $6\frac{3}{4}$ whorls remaining is flat in the space between a carinated periphery and a carina just under the suture; the other whorls become increasingly convex to the last one. Sculpture striate-undulate, reticulate; low plicae are crossed by revolving lines, a tiny point of shell substance rising at each junction of plicae and horizontal lines. This sculpture continues to the periphery of the last whorl, below which are four sharply-defined revolving lines and one microscopic line. Growth lines are fine, not very regular. Aperture ovate and of moderate size, showing the exterior sculpture through the shell substance. Columella slate-colored, thin, narrow, with a twist or fold near the center. Outer lip decidedly incurved from suture to below the periphery. Sinus not large, but distinct.



Figs. 1-3.

Goniobasis clenchi.

FIG. 4.

Teeth of G. clenchi.

Operculum: Thin, reddish-brown, roughly triangular; altitude $3\frac{1}{2}$ mm., diameter 3 mm. Nucleus depressed. Nuclear whorls sharply-marked, widely-coiled. Striae deeply incised and showing the regular growth and change of position of the nuclear whorls with relation to the apex. Apex blunt. Left margin curving, very slightly sinuous, thickened; right margin broadly curved, exceedingly thin; basal margin rounded.

Measurements of shell: Altitude, 24 mm.; diameter, 8 mm.
Aperture—altitude, $7\frac{3}{4}$ mm.; diameter, 4 mm.

Type locality: Choctawhatchee River, Newton, Dale County, Ala. Shells taken "on rocks and along bank on ledges; when in middle of river on rocks in one to three feet of water; the Pleuroceridae crawling there on a fine deposit of silt or very soft mud." Collected by W. J. Cleneh, July 23, 1923.

The number of whorls of an uneroded adult would probably reach ten. On young shells the first whorls have no sculpture save two carinae, one close to the suture, the other at the center. The upper carina sometimes resembles a row of minute beads. The periphery of the whorls of juveniles is angular, the base tending to flatten. In a quite old shell the columella is pinkish-white rather than slate-colored and, because of the addition of callus, the fold is apparent only under the hand-glass. Most of the shells are bright and shining. Variation in color, form and sculpture is slight. Of 78 shells that were cleaned of foreign material, six have a narrow, dark band on the base; all of these are young.

The radula appears to differ slightly from that of *Melania depygis* Say as pictured by Troschel and from that of *Pleurocera elevatum* Say, drawn by F. C. Baker. The formula of the denticles is:

$$\left(\frac{1}{12} + \frac{1}{7} \right) + \frac{1}{4} + \frac{1}{3-4+1+3-4} + \frac{1}{4} + \left(\frac{1}{7} + \frac{1}{12} \right)$$

Goniobasis clenchi, belonging to the group of *catenaria* Say, has some of the aspect of that species, notably the sculpture. It is, however, a more narrow shell, is not so strongly carinate; the lip usually is more deeply incurved; the body whorl is broadly rounded whereas in *catenaria* it is subangulate at the center. *Clenchi* has the distinctive operculum of *catenaria*, which also I have found in *G. arachnoidea* (Anth.) and *G. troostiana* Lea, probably geographical outliers of the *catenaria* group.

Herbert H. Smith recognized this species as new. His localities for it were Choctawhatchee River, near Pinckard, Dale County, and the same river near Geneva, Geneva County, Alabama.

The pictures of the shell and operculum were drawn by Miss Mina Winslow; that of the radula by Mr. Clench.

GONIOBASIS DOOLEYENSIS Lea, Choctawhatchee River, Newton, Dale County, Ala.

The Alabama specimens are somewhat smaller than individuals from Georgia and the plicate sculpture is less pronounced, but in all essentials the shells are the same. The types of *dooleyensis* are from Dooly County, Ga. Walker³ cites it from Early and Baker counties, Ga.; from Chipola River, Fla.; all in the Apalachicola drainage; also from Econfina Creek, Fla., flowing direct in the Gulf. Every one of these streams, including the Choctawhatchee River, come close to one another near their mouths, and probably there has been interchange of fauna.

GONIOBASIS sp., Choctawhatchee River, Newton, Dale County, Ala.

I am unable to recognize this species with the help of descriptions and illustrations published. It may possibly be the form which Lea included under *G. elliotii* as coming from Uchee and Little Uchee rivers, Ala. The shell is slender, smooth, mostly greenish-brown, sometimes dark yellow or nearly black. The apical whorls are carinate, sometimes with two or three or four incised, microscopic, revolving lines. The outer lip is slightly sinuous, the aperture elliptical, the sinus distinct and extended. The shell has a number of narrow bands more often than not.

GONIOBASIS CATENARIA (Say), Itchtucknee River, one mile east of Hildreth, Fla. (Suwanee River drainage).

This is the form which appears in old collections as *M. papillosa* Anth.

³ *Nutilus*, XVIII, April, 1905, p. 134.

MARINE MOLLUSCA OF THE BRIDGEPORT, CONNECTICUT, REGION

BY ARTHUR JACOT

The following Mollusca were collected at the various beaches near the city of Bridgeport, Connecticut. Although the habitats are varied, only a small number of species was secured. This meagerness of the fauna may be ascribed, though probably not entirely, to proximity to the city. Both Gutsell and Mitchell have reported (Bureau of Fisheries Reports) on results to oysters and other marine animals of oil, copper and tar contamination of waters even some distance from the cities. Slightly lower salinity is probably also responsible—though but slightly so. Milford Beach is close to the mouth of the Housatonic River.

Arca (Scapharca) campechiensis pexata Say. Long Beach, Bridgeport; generally distributed, fairly common.

Arca (Scapharca) transversa Say. Long Beach; less common.

Ostrea virginica Gmelin. Common everywhere, the dominant species, forming banks, as at Milford Beach.

Pecten (Plagioctenium) gibbus borealis Say. Long Beach; not common.

Anomia simplex d'Orbigny. Generally common.

Mytilus edulis Linné. Abundant everywhere, especially so at Stratford Beach.

Mytilus edulis pellucidus Pennant. Occasional among the others.

Modiolus (Brachydontes) demissus plicatulus (Lamarck). Long Beach, especially on the marsh side.

Pandora (Clidiophora) gouldiana Dall. Fairfield Beach, Fairfield. Occasional.

Lyonsia hyalina (Conrad). As the preceding.

Cardium (Laevicardium) mortoni Conrad. Very thinly scattered.

Callocardia (Agriopoma) morrhuana (Linsley). Occasional.

Venus mercenaria Linné. Very few.

Venus mercenaria notata Say ?.

- Gemma gemma* (Totten). Long Beach; fairly common.
Gemma gemma purpurea (H. C. Lea). Far more common.
Petricola pholadiformis Lamarck. Occasional.
Tellina (Angulus) tenera Say. Fairfield Beach; occasional.
Macoma balthica (Linné). Long Beach, around the point.
Ensis directus (Conrad). Long Beach; fragments.
Spisula (Hemimactra) solidissima (Dillwyn). Silver Beach,
Milford.
Mulinia lateralis (Say). Milford Beach; fairly common.
Mya arenaria Linné. Common most everywhere.
Pyramidella fusca (C. B. Adams). Not uncommon; Milford
and Long Beach.
Odostomia (Menestho) trifida (Totten). Common generally.
Odostomia (Menestho) bisuturalis (Say). Milford and Long
Beach.
Polinices (Neverita) duplicata (Say). Few.
Polinices (Euspira) heros (Say). Long Beach; occasional.
Polinices (Euspira) triseriata (Say). Milford Beach; occa-
sional.
Crepidula fornicata (Linné). Generally distributed.
Crepidula glauca convexa Say. Common, all beaches.
Crepidula plana Say. Occasional, all beaches; mouth of whelk
shells.
Litorina obtusata palliata (Say). Milford Beach; abundant,
common everywhere.
Litorina rudis (Donovan). Similar to previous.
Litorina rudis tenebrosa (Montagu). Long Beach, on marsh
side.
Lacuna vincta (Montagu). Milford Beach; occasional.
Lacuna vincta fusca Gould. Milford Beach; common.
Eupleura caudata (Say). Fairly common and of general dis-
tribution.
Urosalpinx cinerea (Say). Commoner than the preceding.
Columbella (Anachis) avara similis Ravenel. Fairly common,
Milford Beach.
Columbella (Astyris) lunata (Say). Milford Beach; abundant.
Alecrion (Hima) vibex (Say). Occasional.

Alectrion (Ilyanassa) obsoleta (Say). Long Beach; especially around the west end, and eastward of Milford Beach.

Alectrion (Tritia) trivittata (Say). Stratford Beach, abundant, common generally.

Busycon carica (Gmelin). Silver Beach, Milford, and others; occasional.

Busycon canaliculatum (Linné). Commoner than previous.

Melampus lineatus Say. Abundant on salt marshes.

A comparison of this fauna with that found on the south or ocean shore of Long Island shows a conspicuous absence of the following genera: *Nucula*, *Yoldia*, *Astarte*, *Divaricella*, *Donax*, *Tagelus*, *Siliqua*, *Corbula*, *Turbonilla*, *Epitonium*, *Triphoris*, *Bittium*, *Acteon*, *Tornatina*, *Cyclina*. Although some of these may later be found in this general vicinity, the majority of them are species demanding conditions of full salinity, clean ocean water, and clean sand. At Beaufort, N. C., for instance, *Donax versicolor* was most plentiful on the inlet shores. Once the inlet banks had turned inward far enough to face the sound this species was lacking or rare. There is, therefore, considerable difference in habitats whose substratum conditions are identical but which are situated in a sound or bay and on the ocean proper. In this connection it would be interesting to determine how far eastward beyond Long Island *Donax* may be found, as at Block Island, Martha's Vineyard and Nantucket, before the cold stream from the north would be felt sufficiently to change the temperature conditions found along the south shore of Long Island.

TWO NEW NAIADES FROM NICARAGUA

BY BRYANT WALKER

The following species were submitted to me by Rev. W. H. Fluck of Great Kills, Staten Island, N. Y., for examination and description, if they proved to be new. Both of them appear to be undescribed.

Nephronaias elvaæ n. sp. Pl. I, figs. 1-2.

Shell solid, broad oval, rounded before and behind, sub-compressed, with a very low, nearly obsolete posterior ridge, which scarcely affects the posterior margin and which is outlined by a shallow groove along its posterior side; beaks but slightly elevated, eroded in the specimens seen; surface slightly sulcate towards the beaks, much more so towards the margins and covered with numerous fine striae very close together, which are cut by radial impressed lines extending from the beaks to the margins, which are deeper and further apart anteriorly and posteriorly, giving them a festooned appearance, which is almost granular in the center of the disk; epidermis dark brown, shading into yellowish around the margins, rayless; left valve with two strong, erect pseudocardinals, which are nearly parallel, and two slightly curved laterals; interdentum rather long, narrow and rounded; right valve with a single, strong, elevated pseudo cardinal, the sides of which are about parallel with a small, compressed tooth above it, and one lateral; anterior muscle scars deeply impressed and roughened, posterior scars much less so; pallial line distinct, with radiating sculpture especially on the upper side; naere bluish white, slightly iridescent posteriorly; dorsal scars numerous, deep and situated under the interdentum.

Length 62, alt. 44.2, diam. 25.2 mm.

Type locality, the Wanks River or Rio Coco, Nicaragua.

Type in the collection of Rev. W. H. Fluck.

Mr. L. S. Frierson, to whom a photograph was submitted, suggested that it was very close to *Nephronaias reticulata* Simp., if not identical with it. On sending similar photographs to Mr. W. B. Marshall of the U. S. National Museum for comparison with Simpson's type, he replied as follows:

"At first I thought your shell surely was *Nephronaias reticulata* Simpson, but when I came to examine the sculpture I found that, although Simpson's shell is only about two-thirds as large as yours, the sculpture on his is two or three times as coarse. This put me on the fence as to whether yours is or is not a new species, so I called Dr. Bartsch to my assistance

and, between us, we came to the conclusion that yours is probably different from Simpson's. Your shell is much more round than Simpson's. Simpson's shell is very light chestnut in color. I should hardly call the nacre of Simpson's shell lurid. It is really a dirty white with a little iridescence near the posterior portion."

It would seem, therefore, that the present form is well entitled to a name, even though a larger series might afford connecting links.

There was originally another specimen, a little smaller than the type, but otherwise exactly the same, which was unfortunately lost in the mail.

At the request of Mr. Fluck, I have named the species after his niece, Miss Elva M. Smith.

Anodontites flucki n. sp. Pl. I, figs. 3-4.

Shell obovate, thin, inflated, slightly compressed by a faint depression extending from the beaks to the anterior basal margin; inequilateral; slightly gaping towards the anterior margin, but not posteriorly; beaks moderately full, but little elevated, the tips decidedly incurved; hinge line nearly straight, angled at both ends where it passes into the anterior and posterior margins; anterior end narrowed and rounded; base slightly incurved at about the anterior third, corresponding to the depression across the disk; posterior end regularly and somewhat broadly expanded, the greatest height being behind the middle of the shell; surface smooth with irregular growth lines; epidermis greenish yellow, dark green on the posterior slope and towards the anterior end, with faint narrow, green rays over the center of the disk; nacre light blue, slightly salmon-color within the beak cavities, very iridescent, faintly radiately sculptured.

Length 87.3, alt. 46.5, diam. 31.3 mm.

Type locality, the Wanks River or Rio Coco, Nicaragua.

Type No. 74610, Coll. Walker. Cotypes in the collection of Rev. W. H. Fluck.

As suggested by Mr. Frierson from an inspection of a photograph of the type, this species is evidently rather closely re-

lated to *A. nicaraguæ* Phil. described in 1848 (*Zeits. fur Mal.*, XV, p. 130). It has never been figured or found since. Von Martens (*Biol. Cent. Am.*, 1900, p. 536) believed it to be the same as *A. bridgesi* Lea. If so, it is quite different from *A. flucki*.

Philippi gives the dimensions of his shell as 65 x 37 x 10 mm. As von Martens (l. c.) suggests there is probably a typographical error in the diameter as stated, which is quite inconsistent with the diagnosis, which says "tumida". So far as the length and height are concerned, the relative proportions of Philippi's type and that of *flucki* are substantially the same.

But Philippi states that his shell is gaping at both ends and that the posterior end is "*paullo altiore, oblique subtruncata*," neither of which specifications apply to this species. Philippi applied the term "*oblique truncata*" also to two other species, *A. incarum* and *U. valdivianus*, both of which are figured by Pfeiffer in *Nov. Conch.*, III, pls. 103 and 105, and these show distinctly what Philippi meant by this expression and that it does not apply to the species here described.

CALIFORNIAN HELICES

BY H. A. PILSBRY

HELMINTHOGLYPTA FERRISSI new species.

The shell is depressed, thin, umbilicate, the width of umbilicus contained between 7 and 8 times in that of the shell. Of a pale greenish-buff tint with streaks of deeper green (mignonette-green of Ridgway); above the periphery a rather narrow chestnut-brown band without light borders. The spire has a faintly pinkish tint. Surface is very glossy. The embryonic whorls, after the first nearly smooth half-whorl, are very densely, irregularly granulose. Later whorls have somewhat sharp but very fine retractive striæ. On the last whorl these are quite weak except near the suture. The

whorls increase slowly at first, but the last widens rapidly, is rounded peripherally and descends to the aperture. The aperture is large, oval-lunate; peristome thin, the outer and basal margins slightly expanded, columellar margin dilated, covering part of the umbilicus.

Alt. 15 mm., diam. 27.2 mm.; $5\frac{1}{3}$ whorls.

Above Tehipite Valley, middle fork of King's River, Fresno Co., California. Type 134224 ANSP. Found on going up a zigzag trail northward several miles after leaving Tehipite Valley and Dome, once in forest rubbish among rocks, again at a crumbling cliff; elevation probably around 7000 ft.

About 35 specimens were taken, but very few were in good condition. It is a beautiful species, of a brighter green color than any form of *traski*, and differing in the sculpture, both of embryonic and later stages. The largest one taken measures 27.2 mm. diam., the smallest adult 24 mm.

HELMINTHOGLYPTA UMBILICATA (Pilsbry).

Epiphragmophora tetricula umbilicata Pilsbry, Nautilus, XII, June 1898, p. 22.

Epiphragmophora dupetithouarsi cuestana Edson, Nautilus, XXVI, August 1912, p. 37; XXVII, August 1913, p. 37, pl. 3, figs. 13, 14.

Helix dupetithouarsi var. *concurrus* Hemphill, in collection (Mus. No. 112425 ANSP.).

This is a form apparently related to *H. dupetithouarsi* (Dh.), but lighter colored and more depressed, with a wider umbilicus. Just what relation it bears to other species will doubtless be clearer when it can be dissected, but for the present I am leaving it as a species.

It was collected by Hemphill in the vicinity of Morro, San Luis Obispo Co., thus at a quite low elevation. The unpublished name he gave to the form is mentioned above as it occurs in many collections. Edson's locality was eastward, in the Santa Lucia Range, at an elevation in the neighborhood of 1500 ft. The original set of *umbilicata* was not localized further than San Luis Obispo County. It has not been found beyond the limits of this county.

COLLECTING IN SOUTHERN FLORIDA, THE BAHAMAS AND CUBA

BY D. L. EMERY

During the past summer, with about two months of spare time, I decided on a trip to the West Indies. I left St. Petersburg on July tenth for Miami, where I was joined by Mr. C. C. Allen, a most ardent and thorough collector.

The east coast of Florida is a valuable field and a great many species of both land and marine shells were added to our collections. The hammocks in the vicinity of Miami are rich with the *Liguus*, *Drymaeus* and *Helicina*, while the so-called reefs abound with *Polygyra*, *Urocoptis*, *Chondropoma*, *Thysanophora*, *Microceramus* etc. The Atlantic beach furnishes us with a goodly number of *Spirula* and *Ianthina*, and the shores of the outlying keys yielded *Lueina*, *Loripes*, *Iphigenia*, *Strombus*, *Modulus*, *Cerithium* and *Neritina*. The shrubbery near Miami Beach fairly teemed with *Cepolis*, *Drymaeus*, *Helicina* and *Cerion incanum*, while on the grass we found *Succinea* and in the canal *Perna*. On the jetties at the mouth of the harbor we collected several species of *Thais* and *Nerita*, and farther up were *Tectarius*, *Echinella*, *Planaxis*, *Littorina* and *Siphonaria*. One side trip from Miami was by stage to Fulford, where in the sand thrown up by the dredge in a new subdivision were may varieties of marine forms in a fine state of preservation, which had been buried for many years. Among them were some of the largest and finest *Lucina jamaicensis* I have seen. The periostracum on them was almost perfect while the hinge ligament was practically gone. On the higher beach we found the same as at Miami Beach, several good *Ianthina* and *Spirula*. In the marshy land were a quantity of the *Auriculastrum pellucens*, mostly dead, and *Cyrenoidea floridana*.

After spending all the time we thought we could spare, we took passage on the S. S. Nassauvian of the Allan line for Nassau. We spent about three weeks on the island of New Providence with headquarters in Nassau. I will state here

that the trip was not so much for all the species we could gather as for those from half an inch up which we could collect in quantity for our exchange lists.

Nassau proper, with its rocky and sandy beaches, its rising sunny slopes, lime rock reefs, and at the rear the dense thickets, furnishes all the varieties of collecting one could wish. On the rocky shores we found Nerita, Neritina, Leucozonia, Acmaea, Columbella, Strombus, Livona, Tectarius, Echinella, Siphonaria and many small forms not yet identified. Chitons, of two species, were most abundant. On the Sea Grape and other trees along the shore road we gathered several varieties of Cerions, Drymaeus, Cepolis and a very few small *Oxystyla undata*. This species was one we had set our hearts on, and look as we would, for two weeks not a good live specimen came to our notice. Finally one day while out to Waterloo after Drymaeus I called my partner's attention to a very large one up in the crotch of a gumbo-limbo tree, supposing it to be inhabited by a soldier crab as all the others we had found. What was my astonishment upon dislodging him to find a beautiful live specimen. The next morning, looking over the side of the piazza over Mr. Allen's store, I had to call him up from below to see another almost as large on the side wall of the house. This proved to be alive also, making two to my credit. Of course my friend could not hide his disappointment and I could not let the opportunity for a "good jolly" get by, so had to remind him several times that it was too bad to live for two years in a place and get a little wild fellow domesticated and then have a friend come over and grab it. In some places on the island the soldier crabs are so thick that on a dull morning one can scrape them up by the bucketful. Among these we managed to find about three dozen each of fine Oxystylas.

The Drymaeus proved to be quite scarce until one slightly foggy morning on a pair of sapodilla trees in a yard of one of the natives we gathered over 150 fine specimens. We thought the find and the liberty of climbing the trees worthy of a six-pence from each of us. In the limestone walls of the quarries and some of the street cuts we found a number of perfect

fossils of the *Cerion agassizii*. On the grass at Fort Charlotte *Succinea barbadensis* was very plentiful. In the cut at Union street were *Bulimulus sepulchralis*, *Succinea ochracina*, *Polygyra cereolus*, *microdonta* and a small Thysanophora. One day we walked across the island to the south beach, and among the palmettos were *Chondropoma revinctum* and *Cerion agrestina*. On the shore which was here both sand and rocks we found *Lucina*, *Strombus*, *Asaphis*, *Siphonaria* and *Cerithiums*. Here was a landing place for a conch fisherman, and in front of his cabin were heaps of thousands of the *Strombus gigas*, all with a hole on one side of the spire, where they loosen the part of the animal which is attached. These so-called conchs are a staple article of food with the natives, at the market, in the little cafes, and on all kinds of dry-goods box stands. Along the street, night and day, one can buy the little conch fritters for a penny and the smaller size for a halfpenny. As a novelty these fritters are O.K. but for a regular diet they are the limit, as I found out on my former visit when all the hotels and restaurants were closed.

Jamaica was our objective point, and after providing ourselves with a chart of the island, folding cots and mosquito bars, we waited several days for the steamer, running on a three-week schedule. At the last minute we were refused tickets on account of not having passports. A regulation wartime passport is required going from one British province to another in the same sea. We decided on a trip to Cuba, and the next sailing of the steamer for Miami saw us on the way. After another trip to Brickel's hammock and steaming out about 400 more Liguus we took the Fla. East Coast R. R. for Key West. The trip down is one certainly to be remembered, especially if one tries to study the country and ask a few questions to get a conception of the immense undertaking of constructing and maintaining a railway over these keys and the sea. It is one of the greatest engineering feats of the modern age.

At Key West the collecting is what may be termed slim. We managed to obtain a number of *Cerithium*, *Columbella*, *Siphonaria*, *Succinea*, *Cerion*, *Polygyra* and *Littorina*. The

shore yielded about as much as could be expected with a mean tide of less than two feet.

After what I had heard of the city of Key West, I was greatly disappointed to see the sailing boats and launches which were going to ruin in the harbor, and the large number of warehouses, stores and residences with the windows and doors boarded up, cigar factories closed and the whole place with a look of decline. While here we made the acquaintance of the station master at Cudjoe's Key, and from our description of *Oxystyla floridensis* he thought they were found there. Consequently when he returned we went up with him for a day, and our search resulted in two badly broken and bleached specimens that looked as though the storms brought them. Our day was not wasted, however, as we found a goodly number of the two varieties of *Cerion incanum* which neither of us had seen before, and a *Succinea* not yet identified.

At Havana everything had a look of prosperity—in fact we found it the same wherever we went on the island. We made Havana our headquarters and took trips every day to some of the outside points for collecting. Santiago de los Vegas, Guanajay, Guayabal, Guanabacoa and Playa all proved good collecting ground, and at Matanzas, where we found abundant species. We visited the museum connected with the high school. This, as all other school museums I have seen, was but poorly represented in the conchological line, while the mammalia and fishes were much better. In the vicinity of some of the caves we had fine collecting, especially *Liguus* and *Cepolis bonplandi*. Everywhere we went near the shore we found Cerions in profusion. At Guayabal is a high ledge or bluff with a thick growth of hard woods and vines; here we found the best collecting. The *Megalomastoma*, *Chondropoma* and *Helicina*, three species, were abundant, as well as many smaller forms.

LIST OF SPECIES COLLECTED, AS FAR AS DETERMINED.

a, Florida; b, Bahamas; c, Cuba.

<i>Acmaea leucopleura</i> Gmel.		<i>ornatula</i> Mayn.	b
var.?	b	<i>phoenicea</i> M. & C. ..	b
<i>punctulata</i> Gmel. ...	b	<i>repitita</i> Mayn.	b
<i>Ampullaria miamiensis</i> Pils.	a	<i>santesoni</i> Mayn.	b
<i>Arca barbata</i> Linn.....	b	<i>sculpta</i> Mayn.	b
<i>umbonata</i> Lam.	b	<i>Cerithium eburneum</i>	
<i>Astrea tuber</i> Linn.	a	Brug.	a, b
<i>americanum</i> Gmel. ...	a	<i>minimum</i> Gmel. vars. a, b	
<i>longispinum</i> Lam. ...	a	<i>muscarum</i> Say	a
<i>Auriculastrum pellucens</i>		<i>variabile</i> C. B. Ads..	a
Mke.	a	<i>Echinella nodulosa</i> Gmel. a, b	
<i>Bulimulus sepulchralis</i>		<i>Euglandina minor</i> Fér.? .	a
Poey	b	<i>Eutrochatella sloanei</i> Orb. c	
<i>Bullaria amygdalis</i> Dillw.	a	<i>Fasciolaria tulipa</i> Linn... b	
<i>occidentalis</i> A. Ads..	a	<i>Fissurella barbadensis</i>	
<i>media</i> Phil.	b	Gmel.	b, c
<i>striata</i> Brug.	a	<i>nodosa</i> Born.	c
<i>Cepolis bonplandi</i> Lam. ...	c	<i>viridula</i> Lam.	b
<i>cubensis</i> Pfr.	c	<i>Helicina adspersa</i> Pfr. ...	c
<i>milleri</i> Pfr.	b	<i>clappi</i> Pils.	a
<i>multistriata</i> Desh. ..	c	<i>orbiculata</i> Say	a
<i>troscheli</i> Pfr.	b	<i>submarginata</i> Gray..	c
<i>varians</i> Mke.	a, b	<i>Ianthina fragilis</i> Lam.	a, b
<i>Cerion agassizii</i> Dall (fos-		<i>Iphigenia brasiliiana</i> Lam. a	
sil)	b	<i>Leucozonia cingulifera</i> Linn. b	
<i>agrestina</i> Mayn.	b	<i>ocellata</i> Gmel.	b
<i>eurystoma</i> Mayn. ...	b	<i>Liguus crenatus castaneo-</i>	
<i>glans</i> Kstr.	b	<i>zonatus</i> Pils.	a
<i>carlotta</i> Mayn.	b	<i>eburneus</i> Simp.	a
<i>incanum</i> Binn.	a	<i>marmoratus</i> Pils.	a
<i>fasciata</i> W. G. B.	a	<i>miamiensis</i> Simp.	a
<i>saccharimeta</i> P. & V..	a	<i>mosieri</i> Simp.	a
<i>mumia</i> Brug.	c	<i>fasciatus</i> Null. (Typi-	
<i>mumiola</i> Pfr.	c	cal)	c
<i>mumia chrysalis</i> Fér.	c	<i>castaneus</i> Simp.	a

<i>livingstoni</i> Simp.	a	<i>multilineatus</i> Say ...	a
<i>ornatus</i> Simp.	a	<i>Oxystyla undata</i> Brug.	b
<i>roseatus</i> Pils.	a	<i>Pecten ornatus</i> Lam.	a
<i>testudineus</i> Pils.	a	<i>Pedalion bicolor</i> A. Ads. a, b	
<i>versicolor</i> Simp.	a	<i>chemnitzianum</i> Orb. . a	
<i>vexillum</i> Lam.	c	<i>Melina obliqua</i> Lam.	a
<i>Lima scabra</i> Dillw.	a	<i>Physa acuta</i> Drap.	b
<i>Littorina lineata</i> Phil.	b	<i>Planaxis lineatus</i> Cocta....a, b	
<i>mespilum</i> Phil.	b	<i>nucleus</i> Wood	a
<i>ziczac</i> Chem.	a, b	<i>Pleurodonte auricoma</i> Fér. c	
<i>litterata</i> Phil.	a	<i>minor</i> Fér.	c
<i>Livona pica</i> Linn.	b	<i>provisoria</i> Pfr.	b
<i>Lucina edentula</i> Linn.	a	<i>Polygyra auriculata</i> Say.. a	
<i>Phacoides jamaicensis</i> Lam. a		<i>microdonta</i> Desh. ... b	
<i>pennsylvanica</i> Linn. .a, b		<i>septemvolva</i> Say	a
<i>Codakia tigrina</i> Linn.a, b		<i>Praticolella griseola</i> Pfr. . c	
<i>Margaritiphora radiata</i> Lam.a, b		<i>Proserpina depressa</i> Orb. . c	
<i>Megalomastoma mani</i> Poey c		<i>Rumina decollata</i> Linn.... c	
<i>Chama macrophylla</i> Gmel. a		<i>Siphonaria alternata</i> Say . a	
<i>Chondropoma dentatum</i> Say a		<i>brunnea</i> Hanl.	b
<i>ottonis</i> Pfr.	c	<i>naufragum</i> Stimp.... a	
<i>pfeigerianum</i> Poey ..	e	<i>Sistrum nodulosum</i> C. B.	
<i>pictum</i> Pfr.	c	Ad.	a, b
<i>poeyanum</i> Orb.	c	<i>Melampus bidentatus</i> Say. a	
<i>revinctum</i> Poey	b	<i>coffeus</i> Linn.	a
<i>tenuiliratum</i> Pfr.	c	<i>gundlachi</i> Pils.	b
<i>Columbella mercatoria</i> Linn. b		<i>Microceramus gossei</i> Pfr.. b	
<i>Conus mus</i> Hwass.	b	<i>pontificus</i> Gld.	a
<i>Crepidula convexa</i> Say ... a		<i>Modulus modulus</i> Linn. ... a	
<i>plana</i> Say	a	<i>floridanus</i> Conr. a	
<i>Cypraea exanthema</i> Linn.. a		<i>Muricidea hexagona</i> Lam. a, b	
<i>Cylindrella poeyana</i> Orb.. b		<i>Murex pomum</i> Gmel. b	
<i>jejuna</i> Pfr.	a	<i>Nerita peloronta</i> Linn.a, b	
<i>Cyrenoidea floridana</i> Dall. a		<i>tessellata</i> Lam.a, b	
<i>Detracia bulloides</i> Mont. . b		<i>versicolor</i> Gmel.a, b	
<i>Drymaeus bahamensis</i> Pfr. b		<i>Neritina pupa</i> Linn. b	
<i>dominicinus</i> Rve.	a	<i>virginea</i> Linn. a	
		<i>viridis</i> Lam. a	

<i>Oleacina oleacea straminea</i>		<i>ochracina</i> Gundl. b
Desh. c		<i>Tectarius muricatus</i> Linn.
<i>solidula</i> Pfr. a, b		a, b, c
<i>Opeas micra</i> Orb. a, b		<i>Thais deltoidea</i> Lam. a, b
<i>Opisthosiphon bahamensis</i>		<i>floridana</i> Conr. a
Shutt. b		<i>haemastoma</i> Linn. a
<i>Ostrea elongata</i> Linn. ? var. a		<i>patula</i> Linn. a, b
<i>Spirula peronii</i> Lam. a, b		<i>undata</i> Linn. a, b
<i>Spondylus echinatus</i> Mart. a		<i>Thysanophora vortex</i> Desh. a
<i>Strombus bituberculatus</i>		<i>Truncatella bilabiata</i> Pfr. a, b
Lam. a		<i>caribaensis</i> Sowb. a, b
<i>gigas</i> Linn. a, b		<i>Urocoptis bahamensis</i> provi-
<i>Subemarginula octoradiata</i>		dentia Pils. b
Gmel. b		<i>elegans</i> Pfr. c
<i>Succinea barbadensis</i> Guild. b		<i>Vermicularia spirata</i> Phil. a, b
<i>campestris</i> Say a		<i>Vivipara georgiana</i> Lea .. a
<i>luteola</i> Gld. a		

EULOTA MAACKII, A SIBERIAN SNAIL

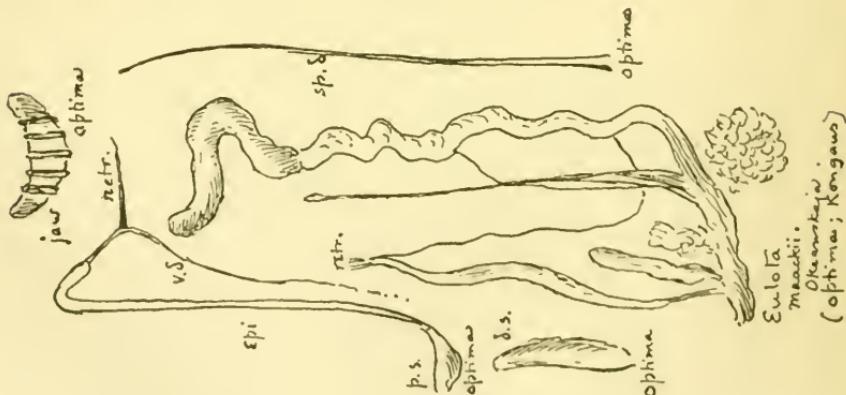
BY T. D. A. COCKERELL

About the middle of the last century R. Maack explored the Amur and Ussuri districts in eastern Siberia. This scientific pioneer made the most of his opportunities, and the results were published in St. Petersburg in three large volumes, 1859 (Amur) and 1861 (Ussuri). Consequently, when my wife and I recently visited Okeanskaja, on the coast near Vladivostok, we noted that the most magnificent butterfly of the region was *Papilio maackii* Ménètries, and the largest and handsomest snail was called *Eulota maackii* Gerstfeldt. Among the plants, Ruprecht and Maximowicz described from the Ussuri district a leguminous genus *Maackia*, which unexpectedly proved inseparable from *Cladastris*, based on a single species growing in Kentucky, Tennessee and North Carolina. There are also species of plants bearing the name of Maack; thus *Delphinium maackianum*, *Lonicera maackii* and *Prunus maackii*.

are recognized as valid today. Gerstfeldt described Maack's mollusca, Diplopoda and Chilopoda; finding, as might be expected, a good proportion of new species. *Helix maackii*, then introduced as new, was said to be found rarely on the middle of the Amur, and also between Sungari and Ussuri. The original specimens had diam. maj. 30, min. 26.5, alt. 24-30 mm. Dr. Leopold von Schrenck (1859-1867), describing the mollusca of the Amur country, was able to record a long series of this *Helix maackii*, of which he recognized a form *elatior*, long. 25, lat. 31 mm., and a form *depressior*, long. 21, lat. 30 mm. The *elatior* form was really the type of Gerstfeldt, but the differences are those of individual variation, high and low spired shells occurring in the same colonies. When I first found *Eulota maackii* at Okeanskaja, early in July, I noted that the animal was dark slate-color, nearly black; no dorsal band; sole dull white, suffusedly greyish anteriorly; mantle brownish-white or pale grey. (*Eulota middendorffii* Gerst. differs in the color of the animal, which is pale, but also with no dorsal band.) This was a matter of interest, showing that there was no particular affinity with the common large Japanese species of *Eulota*, which have a conspicuous and handsome dorsal band. Anatomical examination confirmed the apparent divergence from the Japanese series, and indicated that *E. maackii* belong to true *Eulota*, and was not very remote from the European *E. fruticum*. The stout and short penis-sac passes into a very long and slender epiphallus (about 30 mm. long and 1.7 mm. thick in an Okeanskaja specimen), from the end of which arises the retractor, without any sign of a flagellum. The dart-sac is long and cylindrical, while the mucous glands constitute an amorphous sacculated mass. The vas deferens is about 35 mm. long. The sperm duct is long, simple, swollen at the base, but beyond that filiform, with hardly any bulb. The long and slender uterus has a cylindrical pale yellow albumen gland, about 26 mm. long. These characters are all derived from fresh material.

The discovery of *E. maackii* at Okeanskaja, taken with the previously published records, indicated a wide distribution. It was nevertheless a little disappointing to find the snail quite

unmodified about 400 miles up the coast, in the valley of the Amagu River, n. lat. 46° . The snails we collected were on the Kudia River, a tributary of the Amagu, and although there was much individual variation in the height of the spire, I could not detect any tendency to the formation of a distinct race. There was also no basis for the separation of these coast snails from those of Maack, which were found inland. After this, it was distinctly surprising to find that at Kongaus, a place in the hills no great distance east of Vladivostok, the *E. maackii* were uniformly of a distinct, gigantic race, with a maximum diameter of 33.5 to 34.5 mm., rarely as small as 32.5. The difference in measurement involves a great difference in actual bulk, and the form deserves to rank as a new sub-species, *Eulota maackii optima*.¹ A specimen of *optima* which I dissected differed from the Okeanskaja *maackii* in having the retractor arising from the vas deferens, about 5 mm. beyond the well-defined end of the epiphallus. Whether this is a constant character is perhaps doubtful. The jaw of Okeanskaja *maackii* has five strong thick ribs, in the manner of *E. duplocincta* Mart. That of *optima* has the five ribs well sep-



Anatomy of *Eulota maackii*, from Okeanskaja, and jaw, sperm duct, dart sac, and epiphallus, etc., of *optima* from Kongaus.

¹ Ann. Mag. Nat. Hist., June, 1924, p. 580.

arated, after the style of *E. platyomphala* Middff. My assistant, Mr. A. I. Lavrushin, was so fortunate as to find near Kongaus a beautiful albino shell of *optima*, clear yellowish-white without markings, max. diam. 32 mm. This I will call *mut. albida*. I was interested to learn that there is a nephew of Maack's living in Vladivostok at the present time—an engineer.

NOTES

THE PURPLE DYE OF MOLLUSKS.—Any one desiring information on this subject can find a most interesting and comprehensive account in a paper entitled, "The Dyeing of Purple in Ancient Israel," by Rev. Isaac Herzog, published in the Proceedings of the Belfast Natural History and Philosophical Society, session 1919-1920, No. 2, pp. 21-33. As a summary the author says:—"The art of purple-dyeing in general, which dating from hoary antiquity—the mention of *tekelet* and *arganum* in the cuneiform texts occurs already about 1600 B. C.—passed through a long and checkered career, finally becoming extinct, at least in the Old World, on the fall of Constantinople 1453."—C. W. J.

Copies of Bryant Walker's recent paper on the Aenyclidæ of South Africa can be had, gratis, on applying to him at 1306 Dime Bank Building, Detroit, Mich.

COLORADO LAND SHELLS.—Professor C. R. Crosby of the Department of Entomology, N. Y. State College of Agriculture, recently sent in *Pupilla blandi* Morse, *Vertigo modesta* Say and *Succinea avara* Say from Pingree Peak, Colorado. Also *Gonyodiscus shimcki cockerelli* Pils. from Stormy Peaks at 11,000 ft. The genitalia and teeth of the last are much as in *G. perspectiva*, but the strongly arched, narrow jaw has widely spaced, vertical lines, not close striae as in the eastern species. There are 18.1.18 teeth. Some of the shells show a few, broad, indistinct reddish flammules.—H. A. PILSBRY.

PUBLICATIONS RECEIVED.

FRESHWATER MOLLUSKS OF EAGLE LAKE CALIFORNIA. By G. Dallas Hanna. (Proc. Calif. Acad. Sci., vol. 13, 4 ser. pp. 131-136, pl. I, 1924). Two new species *Carinifex occidentalis* and *Parapholyx mailliardi* are described and figured.

RECTIFICATIONS OF NOMENCLATURE. By G. Dallas Hanna. (Proc. Calif. Acad. Sci., vol. 13, 4 ser. pp. 151-186, 1924). This paper deals with the nomenclature of some 84 species, 59 new names are proposed to replace preoccupied names. Two new generic names are also proposed. *Rimetella* in place of *Ectinochilus* Cossm. 1889 not *Ectinochila* Chand. 1883. It is an interesting case; ordinarily the two names might possibly stand, but Cossmann's name is a section or probably a subgenus of *Rimella*, therefore the genus and subgenus should agree in gender as well as the species. *Smithoceras* is proposed in place of *Polycylus* Mojsisovics 1889, not Lam. 1815.—C. W. J.

DESCRIPTION OF A NEW GENUS AND SPECIES OF FRESHWATER GASTROPOD MOLLUSK FROM THE ETCHEGOIN PLIOCENE OF CALIFORNIA. By G. D. Hanna and E. G. Gaylord. (Proc. Calif. Acad. Sci., vol. 13, 4 ser. pp. 147-149, 1924). This new form, *Scalez petrolia* was obtained from the Midlands Oil Company's No. 1, at a depth of 3306 ft. Based on operculums, which the authors consider belongs to gasteropods in or near the family Amnicolidae; the shell unknown.—C. W. J.

THE ANCYLIDÆ OF SOUTH AFRICA. By Bryant Walker. Published by the author. Full descriptions and illustrations are given of the South African species, several of them new forms, others described in a former number of this journal, together with those of earlier authors. The genera *Burnupia*, *Ferrissia* and *Gundlachia* are represented. The paper is important to those concerned with other faunas for the illustrated synopsis of the new classification of all Aneylidæ and other general matter forming the Introduction.—H. A. P.

THE GENUS GYROTOMA. By Calvin Goodrich. Univ. Michigan, Mus. Zool., Misc. Pub. No. 12, 1924. The genus *Gyrotoma* (*Schizostoma* Lea) has received no systematic treatment in fifty years. The older authors worked with very few specimens, and to a considerable extent duplicated one another's species. Mr. Goodrich's work is based on the unrivaled collections of H. H. Smith, with a study of the earlier types. He recognizes some 13 species disposed in five groups. Several of these groups he believes were derived from various so-called Goniobases—*impressa* Lea, *laeta* Jay, *showalteri* Lea and others, which should be transferred to *Gyrotoma*. The species are illustrated on two excellent plates. *G. hendersoni* and *G. walkeri* are new species which Goodrich credits to H. H. Smith. It is hoped that the author will extend his work to other genera of this intricate family. We cannot have too many papers of such workmanship.—H. A. P.

ON THE VALUE OF NUCLEAR CHARACTERS IN THE CLASSIFICATION OF MARINE GASTROPODS. By W. H. Dall, Jour. Wash. Acad. Sci., vol. 14, pp. 177-180, 1924. Various types of nucleus, Sinusigera and others are specified, and the author concludes that their differences are due to adaptation for a floating larva or the reverse, and should not be regarded as genetically fundamental.

MOLLUSCA OF COLORADO, MONTANA, IDAHO AND WYOMING. By Junius Henderson. Univ. of Colo. Studies, XIII, No 2. This work of 160 pages is a revision of the author's illustrated catalogue of Colorado mollusca (1907-12).with additional material from the other mountain states. The records for this region have been compiled with great care, and prove to be far more numerous than one would have supposed. Keys are provided, and most of the species are figured. The discussion of the *Oreohelix* group is of particular interest. Good progress has been made in dealing with records of species from this region which are of long standing in the literature, but not recently confirmed, and sometimes intrinsically improbable.—H. A. P.

ON A THALASSOID ELEMENT IN THE AUSTRALIAN MOLLUSCAN FAUNA. By Charles Hedley. Victorian Naturalist, XI, No. 4. The genus *Coxiella*, inhabiting saline pools and lakes sometimes over one hundred miles from the sea, is regarded as a marine type of gastropod which has become adapted to these inland waters; hence *thalassoid* in the sense of Bourguignat, Smith and others.—H. A. P.

THE PLIOCENE MOLLUSCA OF GREAT BRITAIN. By F. W. Harmer, (Palaeontographical Soc., vol. 2, pt. 3, pp. 705-856, pls. 57-64, 1923). Another part of this work has recently been received, of which parts 1 and 2 were reviewed in THE NAUTILUS, Jun. 1922. The author died Apr. 11, 1923. This part contains the Trochidae, Capulidae, Fissurellidae etc., and the Tectibranchia, Scaphopoda etc. The biological sequence of the genera seem badly disarranged. The illustrations are excellent.—C. W. J.

ZUR KENNTNIS DER PLIOCÆNEN CRAGFORMATION VON HALL-BJARNARSTADUR, TJÖRNES, NORDISLAND UND IHRER MOLLUSKENFAUNA. von Hans Schlesch. (Abhand. Archiv für Moll. Band 1, S. 309-370, Taf. 1-12, 1924). An account of the Pliocene mollusks of northern Iceland, of which 157 species are recorded, with tables showing their distribution both in geological times and recent.—C. W. J.

THE LIFE-HISTORY AND GROWTH OF THE PISMO CLAM (*TIVELA STULTORUM* MAWE). By Frank W. Weymouth. State of California Fish and Game Commission, Fish Bulletin No. 7, p. 120, 15 figs., 1923.

In this small but meaty volume, the scope of which is indicated rather than described by the title, there undoubtedly comes to hand one of the most important contributions to our knowledge of the West American Mollusea which has appeared in many years. In fact, by weight of this paper alone, *Tivela stultorum* becomes perhaps the most completely known of any mollusk indigenous to our Pacific coast, not even excepting the often-dealt-with abalones. The importance of such

a mass of careful data considered in the broad philosophical spirit which manifests itself in this paper is difficult to exaggerate and renders the contribution a significant one from the standpoint of the general biologist and physiologist quite as much as from the more circumscribed coign of the specialist on Mollusea or the conservationist.

But a hint of its richness of content can be suggested here. The interesting natural history of the Pismo clam, save for the embryonic and early life stages—still, alas, *incogniti*—are treated at length, even so prosaic a phenomenon as the mere manner of distribution of the young and adult clams on the beach being analyzed with such acumen as to afford clues of real consequence to an understanding of the essential bionomics. Perhaps the most important as well as the larger part of the monograph is that which deals with the phenomena of growth (pp. 14-71). Although more than a decade ago Belding showed convincingly that certain strong growth-lines visible on the shell of the mature scallop were seasonal in formation and therefore essentially of the nature of the annual rings in trees, most other students of molluscan life-histories have been unable to offer much in the way of confirmatory evidence, or, even where they admitted its validity, to extend greatly the practical application of the principle. Weymouth's conclusive demonstration of the truly annual nature of the major growth-lines in the Pismo clam and his ingenious working-out of practicable methods of distinguishing them in instances where other influences have operated to obscure them, should give a great impetus to similar work among other lamellibranchs and, be it hoped, among gastropods as well. These records of a strictly seasonal arrest in growth are shown usually to be readily distinguishable from the numerous less significant growth-lines by their heavier pigmentation, by their coincidence with certain concentric thickenings or depressions in the shell, and, very curiously, by their translucence when the shell is held against a strong light—this last alone being well indicative of the fundamental difference in formation of the two types of concentric lines. To the minor intra-seasonal *striæ* it seems that the old and convenient term “incremental

lines" might now well be restricted. Weymouth found that these discoveries enabled him to calculate the age of the thousands of individuals examined with a remarkably small incidence of error or doubt, the oldest specimen recorded having attained the hoary age of 26 years, while in several instances the nearly constantly prevailing peculiarities of the rings for particular years were found, as in the well-known case of rings of trees, to correspond to certain outstanding weather conditions of the years in question — an exceptionally mild winter, a season of extraordinarily high surf, and so on. The heaviest clam noted measured 17.75 cm. in length and weighed 1.415 kg. (3 lbs., 2½ oz.).

Recognition of the facts outlined also made possible some interesting discoveries concerning variation in the size of broods or the surviving fractions of same for different years. As favorable conditions during the spawning and larval history would appear to be more infrequent than distinctly unfavorable circumstances, the yearly fluctuation in numbers of young, and therefore of the commercial clam crop in succeeding years, is frequently very large. This greatly complicates the question of increase or depletion, and leads the author to recommend only very moderate legal measures of conservation, chiefly directed toward the protection of the young, to which floating oil and the depredations of local clammers appear to be the worst menace, until such time as more prolonged investigation gives a conclusive lead toward some more positive effort.

A discovery which will be new to most students is that the very young Tivelas possess a long slender byssus with an anchor of attached sand grains at the distal end, which serves to aid them in holding their own in the loose and constantly moving sand of their habitat until their own weight becomes sufficient, at a length of 2 cm. or over, to enable them to maintain themselves without it. Incidental observations upon *Paphia staminea* and *Macoma nasuta* show that juveniles of these species likewise possess a byssus. The young of the Pismo clam are found to be confined to the intertidal zone, with no less than 90 per cent "concentrated in a strip 13

metres wide" exposed at nearly every tide. The normal range of the adults is both greater in total vertical extent and pitched at a considerably lower level than this (low tide to a depth of several fathoms).

The Pismo clam is shown to be hermaphroditic, both eggs and sperm being produced coincidently, though not as a rule at identical periods of maxima, from the same gonad.

The author does not consider commercial farming of open beach species of this type possible.

Unlike so many modern papers in the field of ecology and bionomics, this one is written in pure English. The lack of either technical verbiage or of words coined to cover phenomena simply demonstrable without them is a blessed relief in a work of this nature and makes reading it a pleasure. It is a pity that so little of the terribly needless mass of extant literature on the taxonomy of our west American mollusks emulates the care and thoroughness of this one in the bonomic field. We systematists should take the lesson to heart.—S. S. BERRY, Redlands, California.

THE KENTUCKY RIVER AND ITS MUSSEL RESOURCES. By Ernest Danglade. Bureau of Fisheries Document no. 934. 1922. This brief article gives some account of the river, with a list of 40 species of mussels. The following summary may be of interest:

"The Kentucky River is approximately 400 miles long and contains many valuable mussel beds. In the upper reaches of the stream these number about two per mile of channel. They have well-defined and characteristic locations easily marked.

"The upper Kentucky River is practically an unknown and unworked mussel-bearing stream and contains an abundance of mussels of commercial value, possessing good nacre and texture. Of these the mucket constitutes about 90 per cent. This shell has a desirable color, texture, and uniformity of thickness throughout. It appears probable, therefore, that this stream may be particularly useful in the near future as a source of remunerative employment for the mussel fisherman and of desirable raw material for the button manufac-

turer. The pearls of this river, as a by-product of mussel fishing, are of small consequence, both in the quantity and quality of the pieces found.

"The railroad and steamboat shipping facilities of the main river, of North Fork, and of lower Middle Fork are satisfactory. On the upper Middle Fork and on South Fork there are no railroad or steamboat connections and shipments must be handled by small boats. In particularly dry seasons of the year transportation must be made by hauling over rough roads. This is especially true of the South Fork.

"The method of shell fishing in the Kentucky River is limited principally to hand picking or to the use of the shell-fork. A stiff bottom in which the mussels bury themselves deeply makes implements commonly used elsewhere in shelling, useless in this river.

"Of 40 species of mussels observed as indigenous to the river, 22 are commercially usable, but only 9 are of relative importance. This number includes as the most common shells suitable for button manufacture: the mucket, the pocketbook, the pimplebacks, the pistol-grip, the long niggerheads, the maple leaf and the fat mucket."

ARIONIDÆ OF NORWAY. By Fridthjof Okland. (Videnskaps. Skrifter, 1922, I, no. 5.) In this excellent account attention is particularly drawn to the diagnostic value of the location of the shield bands, to the variation of the internal organs, and to the distribution. It is fully illustrated with 46 text figures, 5 maps and two colored plates. *Arion subfuscus* is found to the northern extremity of Norway; the big *A. ater* to the seventieth parallel. *A. hortensis* is found only in the south, and possibly was introduced by man. Two of the species treated of, *A. circumspectus* and *A. hortensis*, have been introduced in the United States.—H. A. P.

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THE FAMILY LANCIDÆ DISTINGUISHED FROM THE ANCYLIIDÆ

BY HENRY A. PILSBRY

The large West American fresh-water limpets now forming the genus *Lanx* Clessin have always been associated with the Ancylidæ. Hannibal, in his classification of 1912¹ placed *Lanx* in the subfamily Ancylineæ and its subgenus *Walkerola* in the Lævapecinæ. Subsequently he proposed a subfamily Lancinæ,² without stating what genera it contained. His classification of Ancyli, however, does not appear worth criticism. It was not based upon any new observations or data.

In 1918 Walker³ made a subfamily Lancinæ for the genera *Lanx* and *Fisherola*.

Recently in the course of looking into the characters and position of the adaptive gill or pseudobranch in some New York Ancylidæ I took the occasion to examine several species of *Lanx*, and was surprised to find them without any trace of a gill (pseudobranch). This was confirmed, together with other characters mentioned below, in *L. patelloides*, *L. subrotundata* and *L. (Fisherola) lancides*.

¹ Proc. Malac. Soc., London, X, p. 147.

² Nautilus, XVIII, 1914, p. 24.

³ Univ. of Michigan Mus. Zool. Misc. Pub., No. 6, p. 17. Walker credited the subfamily Lancinæ to Hannibal, but as the latter author neither defined it or stated its contents, he can hardly be author of the group defined by Walker.

As *Lanx* has no lung, merely an open furrow between mantle and foot, its respiration is probably aquatic and effected by the whole of the integuments exposed. It appears to be a river snail, probably in running, well oxygenated water. In this connection, information on its station is urgently needed.

It is strange that no conchologist has noticed hitherto that in *Lanx* the apex of the shell, though generally very near the center, is *slightly before it*, never behind, as in all patelliform Ancylidæ. This anterior position is strongly marked in such species as *L. nuttalli* and *L. lancides*. This last form was said by Hannibal to have the apex "subterminally posterior"!

The characters of shell, pallial region jaw and teeth demonstrate that *Lanx* has no direct or near relation to the Ancylidæ. It belongs to a separate family, related to Lymnaeidæ somewhat as the Ancylidæ are to the Planorbidæ.

The more conspicuous characters are here contrasted :

ANCYLI.DÆ

Shell limpet-like,¹ the apex behind the middle and more or less inclined to the right or left.

A gill (pseudobranch) hanging in the mantle cavity (on the right side in *Ancylus*, on the left in all other known genera).

Jaw in form of a high arch of many small, subequal elements.

Radula various, but not Lymnaeid.

LANCID.E

Shell limpet-like, the apex in front of the middle and on the median longitudinal line.

No pseudobranch or other appendage in the mantle cavity. Animal dextral.

Jaw composed of a large upper piece and two lateral appendages as in Lymnaea.

Radula Lymnaeid.

¹ At least in the comparable genera.

The number of species of *Lanx* is uncertain, as the distribution and variation are still imperfectly worked out. It may be that *L. patelloides* intergrades with *L. newberryi*, but some large lots I have seen do not show intergradation. The distinction

of *Fisherola* as a genus appears to me quite uncalled for, as *L. nuttalli* and *kootaniensis* have intermediate positions of the apex between *F. lancides* and the species with nearly central apices. In fact, I am much disposed to unite all the described forms of the Columbia river system under the oldest name, *Lanx nuttalli* (Hald.); *F. lancides*, *L. kootaniensis* and another unnamed form from the Spokane river being subordinated as subspecies. While I have seen many specimens, they are from few, well separated localities.

What grounds, if any, exist for the distinction of the Pliocene *Zalophancylus* Hannibal have not been made clear. A list of the species of Lancidae follows.

LANX PATELLOIDES (Lea). Sacramento drainage, California.
Syn., *A. patelloides* Binney.

LANX NEWBERRYI (Lea). Sacramento drainage.

LANX SUBROTUNDATA (Tryon). Umpqua drainage, Oregon.¹
Syn., *L. subrotundus* Walker, 1918.

LANX ALTA (Tryon). Klamath River. Appears to me distinct from *patelloides* and *newberryi*, but nearer *subrotundata*. For the present it had better stand as a species.

LANX KLAMATHENSIS Hannibal. Upper Klamath Lake, Oregon. Well distinguished by the depressed form and thin texture. It is the type of s.-g. *Walkerola* Hannibal.

LANX NUTTALLI (Hald.). Columbia drainage. As will be seen by comparing the measurements, locality and collector, Haldeman's *A. crassus* was described from the same specimen. Probably he forgot his former name. The northern *A. kootaniensis* Baird appears to be a subspecies with less anterior apex; I have not seen topotypic material. *Fisherola lancides* is another subspecies of the Snake River, in which the apex is a little more anterior, but some of the original lot before me run close to *nuttalli*.

¹ Said by Hannibal to belong to the "Columbia system," but the reason for this grouping is not apparent.

A VISIT TO THE HAWAIIAN ISLANDS

BY T. D. A. COCKERELL

“For we have seen the golden sun
Sink in the sea,
The moonlight on the palms, and heard
God’s melody.”

It is not uncommon for modern writers, in discussing the islands of the Pacific, to begin by stating that they have little sympathy with the sentimental nonsense of previous authors, but propose to state the facts, and so forth. It is no doubt true that the expression of feeling concerning the islands has often been trifling or insincere, and at times wanting in judgment or good taste; but it should be recognized that language is barely adequate to do justice to the beauty, mystery, and romance of the subject. To the naturalist, at any rate, the splendid blue of the sea, the graceful curves of the cocoanut palms, the varied foliage of the mountain forests, are but the setting for a drama which at once stimulates and baffles his intellect. Whence came this marvellous fauna and flora? What influences have governed its evolution? Why this extraordinary multiplication of species, often with almost unbelievably restricted ranges? In spite of many learned tomes, we are still groping for light on these problems, but hopefully, convinced that their solution will furnish a key to some of the most perplexing questions confronting the biologist. With the facilities for research now established and being developed in Honolulu, we may expect to see the riddles of the Hawaiian biota attacked anew, with modern intensive methods, likely to give results of fundamental importance.

The naturalist of today is indeed fortunate, when he approaches the Hawaiian problem, in finding his path made comparatively easy by magnificent monographic works. The *Fauna Hawaiana*, the volumes of the *Manual of Conchology*, Jordan’s lists of the fishes, give at first the impression that nearly all has been done, not only the fauna, but also the flora has

received elaborate treatment. Yet in spite of all this, it is still easy to make discoveries. Last summer, while I was in Honolulu, Dr. D. S. Jordan obtained a number of fishes new to the islands (some new to science) by visiting the market each morning. Perkins, in his classic Introduction to the Fauna Hawaiianus, stated that in his opinion only about half the endemic or truly native species of insects had been discovered and described. Dr. C. Montague Cooke tells me that he could now about double the species of *Leptuchatina* described in the monograph, and he has numerous undescribed snails of other genera. Thus the present investigator is in the doubly happy position of finding plenty of important work to do, while the foundations have been securely laid by masters of the science.

In still another respect the worker of today has advantages. He finds paved roads around the islands, and facilities for getting about are vastly superior to those of former times. Dr. Perkins writes me (October, 1924): "It is hard to realize now the conditions under which I worked, from 1892 to 1897 particularly. Roads were bad, often impassable in wet weather, and I did most of my work on foot. . . . I cut many paths myself single-handed through the densest wet forests, sometimes 8 or 9 miles in length, and lugged tent, guns, and all apparatus and food on my back in such places."

In the following account of my own brief explorations, I am enabled to give the names of the snails through the kindness of Dr. C. Montague Cooke, who identified nearly all my specimens. I am responsible for the slugs. The hours I spent at the Bishop Museum, looking at the wonderful collection of Hawaiian shells and hearing Dr. Cooke discuss the problems involved, are never to be forgotten. May all his learning and enthusiasm find full expression in print, where it will reach those in other lands, and of later days! He speaks at times of organizing collections and data so that posterity may find it easy to proceed. This he has done and is doing daily, but who can expect that a successor of equal ability will be found? The history of science shows that unfinished work is too often neglected, or falls into incompetent hands, as indeed is true of human activities in general. Let any one familiar with modern

zoology name a dozen or twenty of the leading men now growing old, and ask himself who will step into their shoes. In too many cases one has sadly to say that no candidate is yet in sight, and none is likely to appear.

I had scarcely more than arrived in Honolulu when (July 16) Mr. O. H. Swezey, of the Sugar Planters Experiment Station, kindly offered to show me Mt. Tantalus and the upper part of the Manoa Valley. Mrs. Faus, formerly a student in our department at the University of Colorado, took us up the mountain in her car, and we circled round through the forest on an obscure trail known to Mr. Swezey, who pointed out the characteristic plants, insects and molluscs. Having been familiar with the literature of Hawaiian natural history since 1891, when I helped Dr. A. R. Wallace collect data for the second edition of "Island Life," it was with feelings readily to be imagined that I saw the *Achatinella* snails on the trees, caught the bees of the insular genus *Nesoprosopis*, observed the splendid butterfly *Vanessa tamameamea* circling through the glades, found the singular longicorn beetle *Plagithmysus pulverulentus* in its native home. The entomological results of the trip might form the subject of another article, but we are now concerned with the snails. The species collected on Mt. Tantalus were as follows:

Achatinella vulpina olivacea Reeve. This is the most widely spread form of *vulpina*, and ought to have been the type of the species. As is shown in Man. Conch., it occurs in ten or twelve valleys, the typical *vulpina* apparently only in three. My *olivacea* shells vary from green and pale yellowish to reddish-brown; usually bandless, but rarely with a peripheral black band.

A. stewartii producta Reeve. These are sinistral; remarkable for their large size. The type of *producta* is dextral, and one wonders whether the sinistral race on Tantalus (referred to in the Manual) is not an independent development. It is more robust than the dextral *producta* from the head of Manoa Valley, and looks like a different thing.

A. lorata Fér. A beautiful peg-top-shaped shell; some of the phase called *pallida* "Nuttall," Reeve; others pure white, the mut. *alba*, also named, but not described, by Nuttall (1839).

Amastra textilis Fér. One specimen.

Luminella gravida Fér. I got only dead shells.

Auriculella diaphana Smith. Sinistral.

Tornatellides procerulus Ancey. This minute species originally described from Maui, is widely distributed over the islands. Is it a very ancient, conservative form, or has it some unusual means of travel? On Kauai I found another *Tornatellides (macromphala)* Ancey which has a similar wide distribution.

Endolonta (or *Nesophila*) apparently a new species, which will be described by Dr. Cooke. It is a minute form, with rounded periphery and strong ribbing. I found several in a dead and dry tree-fern stem. It was astonishing to find an apparent novelty in such a well-worked locality, within sight of Honolulu.

Succinea rotundata and a small *Helicina* complete the set.

From near the top of Mt. Tantalus we crossed a marshy depression and came down a zigzag trail at the head of Manoa Valley. Although the distance was short, we found different snails, as follows:

Achatinella bellula Smith, of the pale, straw-yellow, slightly olivaceous, form, wholly without bands, except a very faint brownish one below the suture. This may be called *mut. straminea*, basing the name on the shell figured in Man. Conch., plate 41, f. 10d, but my shell is exactly the same.

A. stewartii Green. Beautiful green shells, usually with two black bands, but one of my shells is bandless. All are sinistral, whereas the original type was dextral.

A. stewartii producta Reeve. A long dextral shell, with narrower aperture than in my *stewartii* or the Mt. Tantalus "*producta*."

Amastra turritella Fér. Varying from warm reddish-brown to practically black.

Auriculella auricula Fér. Both sinistral and dextral shells of this neat little species, and the body whorl varying from white through fulvous to deep reddish-brown. One sinistral shell is entirely very pale yellowish.

Also *Philonesia* and *Opeas*.

At a later date I went with the Trail and Mountain Club to a waterfall at the head of Manoa Valley, in a deep gulch. Here I found the introduced *Opeus javanicum* Reeve, and what was much more interesting, a series of the slug *Philomycus australis* Bergh. This is a rather small pale grey slug, with three longitudinal bands, and irregular mottling both between and below the bands. I have investigated the synonymy, with special reference to the findings of Collinge (Journ. of Malacology, Dec., 1899), and reach the following conclusions:

(1) It is quite probable that the slug was introduced from China, and it may be, as Collinge claimed, identical with *P. bilineatus* (Benson). It has a jaw with numerous sharp ribs, which associates it with *bilineatus* and separates it from the Japanese *P. confusus* (Ckll.), which also differs in other respects. It must be remembered, however, that Benson's slug came from Chusan I., off the coast of China, and may be a local endemic species. A Chusan specimen in the British Museum is reddish-brown, and superficially appears rather unlike the Hawaiian animal. Thus it is premature to assume identity, and the Hawaiian species must continue to stand as *P. australis*.

(2) It is certain that *P. australis* is distinct from the Japanese *P. confusus* (Ckll.) and the Formosan *P. formosensis* (Ckll.). *P. chinensis* (Ckll.), found 1300 miles up the Yangtse, is more uncertain, but I now believe it is not *australis*.

It remains, of course, for some one to ascertain what forms of *Philomycus* occur in various localities in eastern Asia. One may surmise that when these are properly collected and studied, many species will be found.

Much lower in the Manoa Valley, within the limits of Honolulu, the introduced slug *Veronicella leydigii* (Simroth) is common.

After returning from the expedition to Kauai, described below, I was much occupied with the meetings of the Pan-Pacific Food Conservation Conference, and had little time to hunt for snails on Oahu. At Kawaihapai, on the north side of the island, I found it extremely dry, and on the mountain side overlooking the sea could find only *Succinea caduca* Mighels and the introduced *Eulota similaris*. I had been brought up in

England to look upon *Succinea* as almost semiaquatic, and it was surprising to find the genus in the dryest possible places. In Oahu, and particularly at Waimea on Kauai, I found hill-slopes with *Opuntia*, looking exactly like places in Madeira and Porto Santo which were most prolific in endemic Helicidae. But in the Hawaiian Islands one has to go to the moist forest for the native snails, xerophytic regions proving extremely barren, with rarely anything better than some common introduced form. There are some endemic insects which inhabit xerophytic stations, but probably such areas were extremely restricted prior to the changes brought about by man. At Sacred Falls, overlooking the northeast coast, I obtained *Amatra inflata* Pfr. and *Leptachatina fragilis* Gulick. The latter appears in the Manual as a synonym of *L. gummea* Gulick, but I infer that Dr. Cooke now considers it distinct.

In the fossil bed along the face of Diamond Head, where collecting is uncomfortable on account of the burs of the grass *Cenchrus*, I found *Leptachatina oryza* Pfeiffer, and *L. subcylindracea* Cooke, the latter evidently distinct, but first published as a variety of *L. oryza*.

When I went to the islands, one of my chief ambitions was to visit Kauai, the northernmost and in some ways most interesting island. On making enquiries, I was discouraged, being told that the journey would be both expensive and difficult. Very fortunately, I learned at this point that the Trail and Mountain Club was arranging their first expedition to the island, and had no difficulty in making arrangements to go along. As the Trail and Mountain Clubs have a system of interchangeable membership, the fact that I was a member of the Colorado Club at once gave me good standing in that of Honolulu. The trip, with a company of sixteen thoroughly congenial people, men and women, was made under the leadership of Mr. R. J. Baker, a well-known photographer of Honolulu. For fifty dollars each we had five glorious days on the island, with everything found, including a large truck to take us about, and also the steamer journeys back and forth. There was even enough left over for a celebration at the Outrigger Club at Waikiki, and a ride in an outrigger canoe. Certainly

the visitor who cares for out-of-door things cannot do better than get acquainted with the Trail and Mountain Club, which has a permanent office in the Young Hotel.

At a point on the eastern coast of Kauai, we left the road and took the trail leading inland, eventually reaching the Upper Anahola Valley. At different points along the trail I found snails, including *Leptachatina cylindrata* Pease, *L. striatula* Gould, *Microcystis chamissoi* Pfr., *Eulota similaris* Fér., *Opeas clavulinum* var. *hawaiiense* Sykes, and *Helicina knudseni* PilSBry and Cooke. *Microcystis chamissoi*, except for its larger size, is extremely similar to *M. venosa* Pease, which my wife collected last summer on the Island of Rarotonga.

There is a waterfall at the head of the Anahola Valley, which the party hurried on to see, but I stopped at a sharp turn in the trail, where the vegetation was dense and conditions looked promising for snails. I was richly rewarded by the discovery of several specimens of *Nesophila capillata* (Pease), which had not been found since Pease (Am. Journ. Conch., II, 1866, p. 292) recorded it as *Helix capillata* from the "Sandwich Islands." Dr. Cooke has one of Pease's original specimens, so there is no doubt about the identity. The species is omitted from the lists in Manual of Conchology.

On the north side of Kauai are the famous Haena caves, and in this vicinity I met with *Succineu lumbulus* Gld.. *Microcystis chamissoi* and *Eulota similaris*. The *Eulota* were of the bandless form (f. *unicolor* Fér.), while that from the Anahola Valley shows a brown band (f. *zonulata* Fér.). Such variation doubtless occurs throughout the range of the species.

Near the Haena caves, in the sand hills, I was able, following Dr. Cooke's directions, to find the deposit of fossil shells, containing great quantities of the variable *Carelia dolei* Aneey, which appears to be now extinct, all the known specimens being presumably from this deposit. The genus *Carelia*, with many species, is confined to Kauai and the neighboring island Niihau. Along with the *Carelia* I obtained the following:

Amastra nucleola Gld. Possibly also extinct, as the Manual says that although the species is common in collections, all the specimens have the appearance of having been collected dead.

Leptachatima brevicula Pease? The name queried by Dr. Cooke, and in fact it appears to be a different species, the aperture being conspicuously different from that of a cotype figured in the Manual.

L. brevicula micra Cooke. This is known in a living state from altitudes of 1500 to 1700 feet.

L. lencochila Gulick.

L. antiqua Pease? Name queried by Dr. Cooke. It is like the Koloa beach shells figured in the Manual, but very different from the more slender shell figured by Pease. Surely it should receive a new name.

Tornatellides macromphala Ancey. One juvenile.

Endodonta laminata Pease. A typical *Endodonta*, with keel.

Nesophila sp., apparently undescribed, but Dr. Cooke had 3 already, his MS. species "No. 8."

Helicina berniceia Pilsbry and Cooke. Only known fossil.

It would appear that these sandhill deposits are of Pleistocene age, reminding one very much of the deposits in the sandhills at Caniçal, Madeira, and with apparently about the same proportion of extinct species. I greatly regretted that I could not spend more time collecting in this locality.

THE TYPE OF ANCYLASTRUM IS ANCYLUS FLUVIATILIS, MULLER

BY A. S. KENNARD, A. L. S. AND B. B. WOODWARD, F. L. S.

But for the fact that more pressing work engaged us, Mr. Bryant Walker's reading of the facts governing the selection of the type of *Ancylastrum*¹ would have been challenged before.

The Rule (Art. 30, 11 e) is quite clear: "Species are excluded from consideration in determining the type of genera . . . which were not included under the generic name at the time of its original publication."

When *Ancylastrum* was created² the species *cumingianus* had

¹ *Nautilus*, XXXV, 1921, p. 5.

² *Journ. de Conchyl.*, iv, 1853, p. 63. The name was employed, as the author admits, in agreement with Moquin-Tandon, who, however, claims it as his own (*Hist. Moll. France*, ii, p. 483).

not even been conceived; it first appears as a *nomen nudum* in what Mr. Walker admits was a later paper (*tom. cit.*, p. 170), but it was not born until July, 1854 (Proc. Zool. Soc. Lond., 1853 [1854], p. 91). It is quite obvious, therefore, that by no amount of sophistry can *cumingianus* be made the type of *Ancylastrum*.

The case is really quite simple. Although Beck in 1837 had divided the genus and created *Acrolonus* for the *lacustris* group he gave no reasons for so doing. It was Gray in 1840¹ who made the division on anatomical grounds. He did not, as Bourguignat erroneously asserts, make at that time two genera, but as his enumeration of his genera and species shows, separated off his *Vellezia* as a subgenus, without, however, giving it that distinction. His arrangement was:

3. *Ancylus*

1. *Ancylus fluviatilis*

Vellezia

2. *Vellezia lacustris*.

His two divisions were each for a single species and therefore even then monotypical, but all doubt as to the intended types is set at rest by his article in the Proc. Zool. Soc. Lond., 1847 (p. 181), where the same arrangement obtains and the two species are definitely named by him as types.² This last paper has entirely escaped Mr. Walker's observation. It was not until 1857 in his second edition of Turton's Manual (pp. 216 and 220) that Gray made these divisions into two distinct genera.

Expressed in modern manner Gray's classification in 1840 and 1847 was:

Genus *Ancylus*

Subg. *Ancylus* (s. s.)

Subg. *Vellezia*.

Bourguignat in 1853 (*loc. cit.*, p. 63) accepted Gray's subdivisions, but, as the fashion then was, instead of retaining the

¹ Turton's Manual, new ed., p. 217.

² Here also he admits that *Acrolonus* and *Vellezia* are synonyms.

name of the genus for one section as "s. s." he gave a distinctive name for each section, thus:

Genus *Ancylus*

S. g. *Ancylastrum*.

S. g. *Vellezia*.

Bourguignat's *Ancylastrum* was therefore merely a *nom. nov.* for *Ancylus* as limited by Gray.

Now by the Rules (Art. 30, II, f.) "In case a generic name without originally designated type [in this case *Ancylastrum*] is proposed as a substitute for another generic name, with or without type [in this case *Ancylus*, type *A. fluviatilis*] the type of either, when established, becomes *ipso facto* type of the other." Hence the type of *Ancylastrum* is by the Rules beyond question *A. fluviatilis* (Müller), and Mr. Walker's *Pseudancylus*¹ goes to swell the ever-lengthening list of unwanted synonyms.

ON THE HELIX PERSPECTIVA OF MEGERLE VON MUHLFELD VERSUS THAT OF SAY

BY A. S. KENNARD A. L. S. AND B. B. WOODWARD, F. L. S.

Megerle's paper "Beschreibung einiger neuen Conchylien" was published in the Mag. Gesell. Naturf. Freunde Berlin, Vol. viii (pp. 3-11), the title page of which is dated 1818. It seems, however, that the volume in question was published in four parts: Pt. i, 1816; pt. ii, 1817; pt. iii, 1817, and pt. iv, 1818,² and that Megerle's paper appeared in the first part.

Say's name came out the following year in the Journ. Acad. Nat. Sci. Philad., i, p. 18. Consequently Megerle's name holds, and the *Helix solaria*, of Menke becomes its synonym,

¹ *Nautilus*, XXXV, p. 58.

² See Isis, 1818, col. 1448, 1707 and 1809 [The reference to Megerle's paper on page or column 1483—*Ed.*] also Mém. Acad. Sci. St. Pétersbourg, vi-ix.—C. Davies Sherborn (*Index Animalium*). This appears to have been known, in part at all events, to Binney and Bland, for they give the correct date for *Helix cerealis* Megerle, which appears in the same paper.

whilst Say's species will have to take the later name *Helix patula* of Deshayes, and following the nomenclature of the Pilsbry-Johnson "Catalogue" (NAUTILUS, XI, p. 141) be known as *Pyramidula (Gonyodiscus) patula* (Desh.), or yet better as *Goniodiscus patula* (Desh.).

AGNATHOMORPHOUS AULACOPODA

BY H. BURRINGTON BAKER

In a recent paper (1924, Occ. Papers Mus. Zoo. Univ. Mich., no. 156), a provisional arrangement of the "Streptaxidae" was presented. This was mainly based on radulae, although certain other features of the anatomy of *Scolodonta (Systrophiella) eudiscus* and of *Rectartemon jessei* (one incomplete specimen) were included.

Since then, I have dissected *Streptaxis (Odontartemon) glaber normalis* Jousseaume and reexamined the other two species. These new data, which will be figured in a future paper, force a quite different conception of the relationships than that indicated in the article cited above.

The animal of *Streptaxis glaber normalis* is very similar to that of *Rectartemon jessei*. Foot: strictly holopod; i. e., without pedal grooves. Pallial complex: described and figured in this or a related species by Dr. Pilsbry (1907, Man. Con. XIX, fig. lii-5); lung venation much weaker than in *R. jessei*. Penis: shorter and stouter, but fundamentally similar in structure; lower half surrounded by a heavy, muscular sheath, which attaches along the vas deferens; penial retractor inserted at apex and attached to diaphragm on the right of spermiduct ("uterus"). Vas deferens: arises from base of spermiduct, runs straight across to penial sheath, encircles the penis, and finally passes up along the side of that organ to enter at its apex; arrangement similar in *R. jessei* (op. cit., fig. x-55), and portion above penial sheath shown in my figure (although I did not recognize it at the time). Free ocular retractors: short;

right one fused posteriad with the left to form a common band, which is about half as long as either free muscle and joins the tail retractors near the level of the mantle edge. In *R. jessei*, both eye retractors join a broad band of muscles that retract the snout; in both species, the right ocular is completely free from the genitalia. Jaw: absent, only represented as a low, rounded fold above the buccal aperture.

Further study of the animal of *Scolodonta eudiscus* brings out the following additional features. Columellar muscle: receives the long penis retractor near the base of the liver, the pharyngeal muscle at about the middle of the body cavity, then the two right oculars and finally the two left ones, which unite with the tail retractors near the foot; right ocular bands pass between penis and vagina. Jaw: represented by a definite, sharp-edged, crescentic fold, which looks like a true jaw but is quite plastic; examination under high magnification shows that this structure is covered with a thickened epidermis composed of polygonic cells. Thus, although a coherent jaw is absent, a vestigial, homologous development is certainly recognizable. Foot: margined on either side by a distinct pedal groove, both of which terminate at a definite, caudal mucous pore below a small, dorsal projection; above each pedal groove, a rounded ridge is marked off, except near the caudal end, by another, less regular furrow; each longitudinal ridge terminates anteriad as a small, suprapedal lobe under the snout. The foot of *Happia (Happiella) guildingi* (Bland) is fundamentally similar, but the projection above the mucous pore is very much longer, as figured by Bland himself (1865, A. Lyc. Nat. Hist., N. Y., VIII, 157-9, figs. 3).

From the above descriptions, it will be seen that *Scolodonta* (subgenus *Systrophiella*) and *Happia* (section *Happiella*) cannot be included in the Streptaxidae as they are apparently much more closely related to the Aulacopod families than to the Holopod ones. In fact, they appear to have certain characters in common with the superfamily Agnatha, but *Scolodonta*, at least, differs in the close approximation of the cerebral ganglia, which are practically fused as in the Agnathomorpha. For these reasons, a separate family is necessary for at least *Scol-*

donta and *Happia*; from the radulae and shells, I believe that this should also include *Austroselenites*, *Zophos* (?), *Drepanostomella*, *Martinella* (?) *Miradiscops*, *Tamayoaa* and *Guestieria*.

The American families of Sigmurethra with purely carnivorous dentition, all of which have short cerebral commissures, may be separated by the following provisional key:

- A' Foot aulacopod, bounded by pedal grooves and with a caudal mucous pore; penial retractor a branch of columellar muscle Scolodontidae

A'' Foot holopod; penial retractor usually attached to dia-phragm

B' Kidney oblong, parallel to pericardium; jaw well de-veloped; radula with Zonitid laterals Haplotrema-tidae

B'' Kidney not parallel to pericardium; jaw obsolete; radula with strictly aculeate laterals

C' Kidney oval, transverse; right ocular retractor typ-ically not associated with genitalia; shell helicoid to discoid Streptaxidae

C'' Kidney triangular, oblique; right ocular retractor passes between penis and vagina; shell usually elongate, often with truncate columella Oleacinidae

The Scolodontidae may be further defined by the following sets of characters. Shell: thin, transparent to translucent, helicoid to discoid, with simple or emarginate peristome. Kidney: very long; parallel to pericardium as in the Haplotremaidae. Jaw: vestigial (to functional?). Laterals of radula: anterior ends narrow and elongate; cusps aculeate or fimbriate.

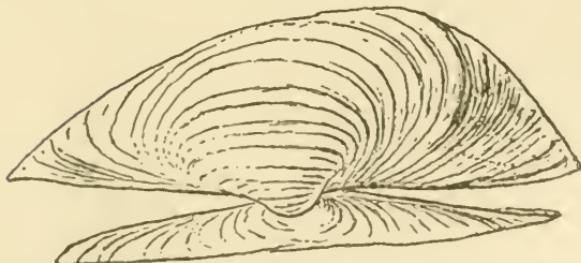
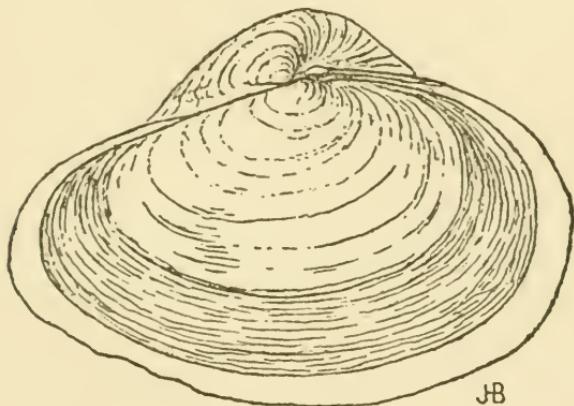
The Streptaxidae certainly include *Streptaxis* and *Rectartemon* (*Artemon* of authors); the other American groups are probably *Polygyratia*, *Systrophia*, *Entodina* and *Ridleya* (?). Shell: heavier and more opaque, usually with reflected peristome, often with teeth or lamellae. Jaw: truly absent. Laterals of radula: anterior ends expanded to form large areas for attachment; cusps strictly aculeate. Although the venation of the lung is

very weak in the smaller species, it resembles that of the Oleacinidae in at least one of the larger forms (*Rectartemonaessei*).

AN ABNORMAL CLAM

BY J. HENRY BLAKE

During my visit to Provincetown, Cape Cod, in August, there was given to me a curiously deformed clam, *Mya arenaria* Linn. This specimen was dug with other normal clams from the



"flats" at the western end of the harbor by Mr. Newcomb, a native of the town. It was alive when taken and apparently as "happy" as its neighbors.

Its striking abnormality attracted my attention and I have

thought it of sufficient interest for the readers of THE NAUTILUS. The two illustrations here given, natural size, will show the appearance of the specimen better than any words I may offer.

The right valve is much smaller, quite flat, in one part a little concave, and about half covered with a yellowish epidermis. The left valve is extremely convex and thicker than the right, its umbone projecting over the latter, and with slight radiations on the anterior part.

One can easily contemplate the volition of some enthusiastic paleontologist who found such a shell in a fossil state, and it suggests a lesson to the hasty so-called species maker.

CONCHOLOGISTS IN THE MAKING

BY EDWIN E. HAND

Hyde Park High School, Chicago, Illinois

As aftermath of the World War, it seems that very little can be accomplished without "a drive." There's a drive for this and a drive for that, a lot of advertising is done, a day set apart and the trick is turned.

Since no one has started a drive for future conchologists we are pegging away in the good old-fashioned way. If results are inadequate, why not have a DRIVE?

Given 150 young boys and girls about 14, to be taught general science, how do we get them interested in the lowly snails and their shells.

A tea strainer securely tied to a stick six feet long accompanies us to Jackson Park, just south of the beautiful art building of World's Fair fame. On the bottom of the clear water lagoon, within easy reach, lie thousands of *Goniobasis* and *Pleurocera*. On the bank, with eager, expectant faces, stand 40 of these boys and girls seeing a snail for the first time in their lives.

A few sweeps of the tea strainer and enough snails are gathered to place in their outstretched hands all the specimens they wish to take home and place in their "glass of water" aquar-

iums. These are watched a few days and proudly introduced to little brother or sister or friends. Afterwards the poor snails are killed by dropping into boiling water, then in a few seconds removed from their shells, the shells cleaned and mounted in the cigar-box apartments. The names and required data are written in corresponding spaces on inside of cover; other kinds, *Planorbis*, land shells, etc., are added; trades are made, gifts from friends begin to come in; a few sea shells are bought, and soon the boxes are on exhibition.

A new game has been tackled, and by following directions a touchdown is scored. The collections are judged by votes of their makers, and prizes are awarded. The first prize this time was a *Xenophora*—the original shell collector—whose story would have been unbelievable without the experience of the senses of sight and touch.

Then comes the question of correlation of this work with their other studies. What can be more noticeable than the “*Nautilus*” in its three-fold complex; the shell, natural and sectioned; the poem, so technically exact and so marvellously musical, from which always some bright boy or girl can quote, and the magazine (ours, not “new thought”) absolutely new to all?

Yes, and books: Baker’s “Mollusea of the Chicago Area”; Ward’s “Catalog of Mollusea”; Rogers’ “Shell Book,” to be ordered for one of their Christmas presents, and other books too numerous to enumerate.

We correlate with history. The money cowry and its story is in the boxes. *Pecten hastatus* “dredged from 50 fathoms off San Pedro,” gift of the Oldroyds, with its “bristling spears” and coupled with its cousin *jacobaeus*, carries us back to the times of the crusaders.

The bleeding tooth, olives galore, *Cypraea annulus*, with its ring of gold, from the Business Manager of THE NAUTILUS, and a perfect shower of shells from Becker, A. J. Brown, Chace, Farrer, Ferriss, Remington and others to come when they read this—connect us with the greatest of all sciences—generosity or is it LOVE? Many of these children are surprised when I tell them that these shells are sent (if I am wrong, please correct

me), because the donors want others to feel the joys they have felt, not only in receiving but in giving.

Finally, *Purpura* connects us with royalty and the Shell on the Stamp of Travancore, to Philately.

Polygyra texasiana texensis, obtained by the author at Sanderson, Texas, this summer, reposes in the boxes as a constant reminder of Dr. Pilsbry's tussle with the naming problem.

Thus it goes on year by year.

Friend Higgins reminds us that "naturalists are born, not made." Friend Johnson tells of Remington and Clench who were drawn into the field of conchology by visiting the Boston Society of Natural History. Our Mr. Conrad sent forth Dr. Zetek, from his school and mayhap there be many others.

I may not have a single famous collector to my credit, but I claim the honor of having given thousands of Chicago boys and girls a new outlook on life; a love of nature's beauties from stars to snails; a knowledge of great names in many realms, and of books for their own libraries. But I suppose if we want real rabid conchologists or anything else, we shall have to get up a drive.

Hear, ye high schools, let's have a drive!

NEWFOUNDLAND SHELLS

BY E. G. VANATTA

Mr. Bayard Long collected the following species of Mollusca while on a botanical expedition in Newfoundland. He noticed *Arion ater* (L.) at many places near Bay Bulls. This is the only American locality for the species, except one specimen found in a garden at Detroit, Michigan, as reported by Dr. Bryant Walker. The Arions were identified from dried specimens by the jaws and radulae and Mr. Long's notes. The single *Gonyodiscus cronkhitei* is not quite so angular as typical var. *anthonyi* Pils. *Lymnaea peregra geisericola* Beek, described from Iceland, is also an addition to the American fauna. It has been compared carefully with Iceland specimens.

- Vertigo hoppii* Bk. (?) Brig Bay and Flower Cove.
Polita hammonis (Ström), Brig Bay.
Arion ater (L.), Bay Bulls.
Arion fasciatus Nils., Trepassey and Whitbourne.
Gonyodiscus cronkhitei anthonyi Pils., Brig Bay.
Succinea arara Say, Brig Bay and Flower Cove.
Succinea ovalis Say, Flower Cove.
Lymnaea palustris (Müll.), Sandy Cove and Flower Cove.
Lymnaea peregra geisericola Bk., Junction Pond, Whitbourne.
Anodonta marginata Say, Junction Pond, Whitbourne.

ADDITIONS TO THE LIST OF MARINE SHELLS OF SANIBEL, FLORIDA

BY WILLIAM J. CLENCH

University of Michigan

During the summer of 1923, a second trip was made to Sanibel, Florida. Unfortunately, this trip was made during the same season of the year as the previous trip, and, as a consequence, seasonal differences in the fauna were not observed. However, a few additional species were obtained and more notes on some of the species collected on the first trip was secured. (Naut. Vol. 37, pp. 52-56, 1923.)

General conditions on the island were similar to those of 1921, except for a deposit of mud and silt along the gulf side of the island, some four or five hundred feet off shore. Heavy rains in the fall of 1921 caused the Caloosahatchee River to carry an unusual amount of sediment into San Carlos Bay, which was carried by the outgoing tides around the point of the Island and deposited off shore. This caused a condition unfavorable to many sand-loving species and, compared with their abundance on the former trip, their absence was noticeable.

Many more trips were taken during 1923 to the northwest end of the island in the region of Blind Pass and Clam Bayou. Very large specimens of *Busycon perversus* were collected in the Pass, the species being especially plentiful around the beds of *Venus campechiensis*. Three large specimens of *Pinnu muricata*

and a single specimen of *Conus proteus* were found alive in shallow water at the entrance of Clam Bayou. The *Pinna* were buried, hinge down, in the sand, with about an inch of the shell protruding into the water, and were covered with a growth of algae which concealed them very effectively. A new part of Clam Bayou was visited which yielded a very rich harvest of *Barnea costata*. These shells were located by small holes in the sand which occurred usually in groups of from three to twenty. They were buried about eight inches in the sand, their siphons extending about halfway to the surface.

The following list is composed of new records and notes not recorded on the previous list:

Pecten nodosus (L.).—A single small valve only. I have seen specimens of this species accredited to Sanibel 5½ inches long.

Mytilus recurvus Raf.—Tarpon Bay. A single valve only. This was found with some debris on an oyster bar near the wharf landing.

Venus campechiensis Gmel.—On my last list this species was noted only from Clam Bayou. This year a few specimens were taken in Tarpon Bay in about five feet of water. A large bed of this species was found in Blind Pass, a strip of water separating Sanibel from Captiva Island to the north.

Cyrena floridana Conr.—Very common. This species was only collected dead in 1923. However, on this trip, a small bed was found in Tarpon Bay, located near high-water line among the mangrove roots. It was peculiar to note that these were especially abundant in the sand (1 to 2 inches deep) in the little rivulets draining this swamp area. Similar beds were located all around the bay, always near high-water line, under the circumstances noted.

Tellina alternata Say.—Three dead specimens of this species were picked up at low water along the beach.

Cerithium floridanum Moerch.—Gulf side of island. A single specimen only.

Cantharus tinctus Conr.—Tarpon Bay. On my previous list I reported this species only from the gulf side of the island, and inhabited by hermit crabs. On this trip several specimens were taken alive in the bay on the oyster bar.

Voluta junonia Hwass.—A splendid specimen of this species was presented to me by a resident of the island. This was one of eight specimens collected along the beach by him during the winter of 1922–1923.

Crepidula aculeata Gmel.—Gulf side. Two specimens only. This seems to be a deeper-water form than the other species of *Crepidula* collected on the island. Both of these specimens were attached to the base of a sponge which was brought in by a storm.

A great many more species undoubtedly exist on and about this island. During both trips only a short time was devoted to marine collecting, and more intensive work would reveal many species not recorded so far, especially if it extended over sections of the island along San Carlos Bay. During the winter months many specimens are cast up on the beach that are never seen at any other season of the year. A local collector had a specimen of *Dolium* collected during the past winter (I believe *Dolium gulea* L.), and he described many other shells, but his descriptions were too meagre in detail for specific determination.

NEW SHELLS FROM JAPAN

BY WM. H. DALL

Mr. J. B. Langford of Honolulu, long a noted collector of Hawaiian marine mollusca, has of late been domiciled in Japan where his activities have continued. His collections have been chiefly littoral, and, since the earthquake, have been diminished by the dislocation of the shoreline and consequent disappearance of many of its normal population of mollusca. Most of the species sent were familiar, but a few appear to be undescribed, especially a remarkable *Chiton*, which, having been submitted to Dr. Pilsbry, seems to typify a new group as well as a new species. In his opinion it is most closely related to the *Placiphorella* group.

LANGFORDIELLA, new genus.

Form broad and short, little elevated, the girdle produced in front as in *Placiphorella*; insertion plates short, thick, and pectinated, the tail valve without slits. Type, *Langfordiella japonica* n. sp. U. S. Nat. Mus. Cat. No. 333541.

Langfordiella japonica n. sp.

Valves narrow and wide, much eroded in the specimens, a young individual shows no defined jugal area, the general upper surface of the valves smooth except for incremental lines and two strong ribs extending to the margin; insertion plates in the adult short, thick, strongly pectinated; in the anterior plate about 12 groups of pectinations; intermediate valves with one slit between coarse pectinations; tail valve heavy, with no slits and feeble indications of pectination; sinus very shallow, hardly defined. Interior of valves white, with a greenish tinge on the anterior valve. Girdle brownish, leathery, produced in front, irregularly studded with short stout brown spinules, often with a swollen apex, and slender microscopically sealy hairs not distributed with any apparent relation to the sutures; gill rows ambient, muzzle triangular. In a dry specimen the shelly portion measures 32 mm.; over all, with the contracted anterior portion of the girdle 39 mm.; breadth of valves 31 mm. The coloration of the upper surface is difficult to determine, owing to erosion, but in the youngest specimen there are reddish longitudinal streaks with pale intervals while the distal portions of the valves are nearly black. One of the larger specimens is more generally reddish, and another is almost wholly blackish.

Locality. Emi Bashiu, Japan; others are from Nemoto Bashiu.

Mr. Langford notes that the coast where these specimens were collected was raised during the earthquake about ten feet. The bottom is a soft rock in which the chitons made little circular holes to roost in. These holes are very numerous but at present all empty.

Stilifer castaneus n. sp.

Shell small, smooth, naticoid with a short mucro; very dark chestnut brown; whorls about three, exclusive of the mucro, the last much the largest, somewhat appressed, the suture not deep; surface with microscopic spiral striulae, and faint incremental lines, base rounded, imperforate, pillar thin, arcuate; aperture ovate, the margin thin. Height, 4.5; max. diameter, 3.3 mm. Type, U. S. Nat. Mus. Cat. No. 333545.

Locality, Emi Bashi, Japan, Langford. Attached to an echinoderm of undetermined species, which has disappeared from the locality since the earthquake.

The color of this and the following species is unusual, the greater number of the members of the genus being pure white.

Stilifer perdepressus n. sp.

Shell very dark chestnut, of about three whorls with prominent mucro; the last whorl much the largest, much depressed, suture appressed, surface smooth except for lines of growth; base rounded, pillar thin, the upper part reflected over an impressed umbilical dimple; aperture ovate, the outer lip obliquely refractive. Height, 2.75; max. diameter, 3.0 mm. Type, U. S. Nat. Mus. Cat. No. 333546.

Locality. On echinoderms at Chikura Bashi, Japan, Langford.

Strombiformis langfordi n. sp.

Shell minute, yellowish, except the last whorl which is pale with a peripheral yellow-brown narrow line; surface polished, suture appressed: hardly evident: whorls about nine, the apical whorl blunt, the shell slightly dextrally bent; the whorls flattened, the base somewhat produced, imperforate; aperture subovate with the lip and pillar thin. Height, 5.0; max. diameter, 1.5 mm. Type, U. S. Nat. Mus. Cat. No. 333555.

Locality. Shimoda Izu, Japan, on *Helicocidaris crassispina* (A. Agassiz), Langford.

NOTES ON THE MACTRAS OF THE WEST COAST

BY A. M. STRONG

The Mactras of the Pacific Coast of North America have always been a difficult group to collectors and students. Almost all the species are known to have a very wide range but as they are seldom found above low-tide line and the thin, brittle shells do not last long when washed ashore, but few good specimens are to be seen in the collections. Even now some of the species are very imperfectly known and there has been much confusion in the application of the names given by the early writers whose meager descriptions were based on poor material.

The literature on the group is not extensive in the works commonly quoted. Gray, in the Mag. Nat. Hist., 1837, described *Mactra exoleta* from the Gulf of California. In the same year Conrad in the Journ. Acad. Nat. Sci., Phila., vol. 7, described *Mactra planulata*, *Mactra californica* and *Cryptodon nuttallii* from shells collected by Nuttall on "muddy marshes bare at low tide" at Santa Barbara. Three species were described by Gould, *Mactra falcata* from Puget Sound in the Proc. Boston Soc. Nat. Hist. for 1850 and *Mactra nasuta* from San Pedro and *Lutraria undulata* from La Paz in the Proceedings for 1851. Gould in his Otia, p. 210, says of *nasuta* Gld., "This species agrees so nearly with *M. falcata* Gld., that until a direct comparison is made it may be considered synonymous." Carpenter, in his review of these different species (Report of 1863, p. 613) says: "Conrad's types being lost, and his species imperfectly described from very young specimens, a difficulty attends their identification, Dr. Cooper found very large valves (resembling *Sehzothaerus*) in abundance, but much deformed by the entrance of sand, and apparently killed by the fresh waters of a great flood. The large shells belong to two very distinct species, which are probably those of Conrad; among the small shells is perhaps a third, which may be Dr. Gould's suppressed *nasuta*." Carpenter's application of the earlier names was unfortunate and resulted in much of the later confusion, particularly as seen in the labels in the older collections.

Conrad in the Amer. Journ. Conch., vol. 3, p. 193 (1867) described *Mactra dolabriformis* and *Mactra catilliformis* from Panama. Both of these species are now also credited to California waters. Dr. Dall in the NAUTILUS, vols. 7 and 8 (1894), redescribed several of the species and added *Mactra hemphilli* from San Diego. In the same connection he suggested the name of *Mactra alaskana* for the Alaskan shell previously referred to *Mactra fulenta* Gld. The next work on the group appears in a review of the nomenclature of the Family Macridae by Dr. Dall published in the Trans. Wagner Inst. Sci., vol. 3, part 4 (1898), where these various species are listed under genera, subgenera and sections with a number of changes from the previously used arrangement. Finally in Bull. Dept. Geol., Univ. of Cal., vol. 9 (1916), Earl L. Packard reviewed all the West Coast species, both living and fossil. The results of this last work does not appear in the list of West Coast Shells in Bulletin 112 of the United States National Museum.

We now have the following species recognized from the West Coast whose ranges are reported to reach as far north as San Diego.

ANATINA UNDULATA Gould, 1851.

This is the *Lutraria undulata* of Gould, the *Raeta undulata* of Carpenter, and the *Labiosa undulata* of Arnold and Keep. The range is given by Dall as San Pedro to Panama and it is fully described in Arnold's Paleontology of San Pedro, p. 177. It is a southern shell of which a few valves have been found washed up on Southern California beaches and it is easily recognized by the "concentrically undulated" surface.

MACTRA (MACTROTOMA) CALIFORNICA Conrad, 1837.

This shell is fully described by Packard and Arnold as well as by Dall in the Trans. Wagner Inst. of Sci., vol. 3, part 4, p. 876. It is not the *Standella californica* of Carpenter or the *Mactra californica* of Cooper but seems to be in part at least the *Standella nasuta* of Carpenter. Dall gives the range as Neah Bay to San Diego but Packard gives *Mactra angusta* Desh. as a synonym and as this was a Panama shell the range can be

greatly extended. The species is not uncommon in Southern California and living specimens are sometimes found on the mud flats at low tide. It is the smallest of the Coast species, an inch and a half or less in length and according to Arnold is distinguished by its thicker shell, nearly central beaks and more obtusely rounded anterior end.

MACTRA (MACTROTOMA) DOLABRIFORMIS Conrad, 1867.

This species was redescribed by Dall in the *NAUTILUS*, vol. 7, p. 138, and the description is copied in Orcutt's Molluscan World, No. 1627. Dall gives the range as from Lobitas, California, to Topolabampo, Mexico, but Conrad's type is given as from Panama. It is a rare species of which a few specimens have been dredged in Southern California waters. The shell is much compressed, resembling *Spisula falcata* Gld., but with more central beaks, more elongated shape, and larger, the adult three and a half to four inches in length.

MACTRA (MACTROTOMA) NASUTA Gould, 1851.

There has been a great deal of difficulty in fixing Gould's shell. He gives the localities in "Otia" as San Pedro and La Paz. The shells to which Carpenter, Cooper, Keep, and others applied the name are now considered to belong to other species. Dall gives the range as San Diego,? West Columbia, and Oldroyd has recently, *NAUTILUS*, vol. 31, p. 97, reported the species from Puget Sound. Packard in his paper, p. 278, lists the shell and gives as synonyms *M. californica* Desh., *M. fragilis* Cpr., and *M. deshayesii* Conr., all of which were from the Gulf of California. Packard says of the shell, "The lack of sulate beaks, the pronounced gape, the more ventricous form, besides several details of hinge, will serve to separate this species from *M. californica* Conrad with which it is often associated."

MACTRA (MACTRELLA) EXOLETA Gray, 1837.

This is the *Mactra exoleta* of Gray, Carpenter, and Arnold and the *Mactra ventricosa* of Gould and C. B. Adams. The range is given by Packard as San Diego to Panama. There may be some question as to the accuracy of the San Diego record for

the living shell though it is well authenticated from there as a Pleistocene fossil. Arnold gives a full description, p. 175, and says that it is easily distinguished by "the sharply angular trigonal shape, great convexity, elevated umbo, and sharp submarginal posterior ridge."

SPISULA (HEMIMACTRA) VOYI Gabb, 1866.

While this species was first described from a fossil by Gabb in his Pal. Cal. vol. 2, p. 24, Packard states, p. 283, that it is represented by a living form in Dall's *S. (polynyma Stimpson, var.) alaskana*. This synonymy would include in part the *Mactra falcata* of authors. Dall gives the range for the living shell as Arctic Ocean to Puget Sound and he described it in *NAUTILUS*, vol. 7, p. 138, and vol. 8, p. 40.

SPISULA (HEMIMACTRA) CATILLIFORMIS Conrad, 1867.

This species was redescribed by Dall in the *NAUTILUS*, vol. 7, p. 137, and the description is copied in Orcutt's Molluscan World, No. 1625. It is the *Standella californica* of Carpenter and the *Mactra californica* and *Mactra planulata* of Cooper. The shell is well figured in Keep. The large, thin valves, four inches or more in length, are not infrequently washed up on the California beaches during storms. Arnold says of it, "distinguished by its large size, broad, almost oval outline, prominent cartilage pit, long depressed area in front of the umbo, and nearly equally rounded ends." Dall gives the range as Neah Bay to San Diego but Conrad in his original description states "Inhabits Panama."

SPISULA (HEMIMACTRA) HEMPHILLI Dall, 1894.

This species was described from San Diego by Dall in the *NAUTILUS*, Vol. 7, p. 137, and the description is copied in Orcutt's Molluscan World, No. 1626. The range is given by Dall as San Pedro to San Diego. It is the largest of the Coast species, reaching a length of six inches, and according to Packard is distinguished from *catilliformis* by the more elongated shape, longer laminæ, and more oblique pallial sinus.

SPISULA (SYMMORPHOMACTRA) FALCATA Gould, 1850.

Dall in the Trans. Wagner Inst. Sci., vol. 3, part 4, gives this species as the type of the subgenus *Symmorphomactra*, though in the later Bulletin 112 of the United States National Museum he lists it with the *Hemimactras*. Carpenter and Cooper included in the species shells which are now considered to belong to other species and Cooper considered *M. nasuta* Gld. a synonym. It is a rather small shell, about two inches in length, and is sometimes found at low tide near the entrances to the California bays. The range is given by Dall as Puget Sound to Coronado Islands. The species is described by Arnold, p. 176, who states, "distinguished from the other species by narrower, more acutely rounded anterior end, and interior radiating ridges."

SPISULA (SYMMORPHOMACTRA) PLANULATA Conrad, 1837.

This is a little known species. It is the *Spisula planulata* of Dall in the *NAUTILUS*, vol. 8, p. 40, but not the *Standella planulata* of Carpenter or the *Mactra planulata* of Gabb, Cooper or Stearns. Packard in his paper, p. 293, describes the species and states that it is of the general size and shape of *S. falcata* Gld. but flatter and more inequilateral. Dall gives the range as Monterey to Cape San Lucas.

SCHIZOTHAERUS NUTTALLII Conrad, 1837.

This the *Cryptodon nuttallii* of Conrad, the *Tresus maximus* of Middendorf and Gray, and the *Lutraria capax* of Gould. It is a well-known Coast shell, ranging from Wrangell, Alaska, to San Diego, and has been fully described many times.

The synonymy and localities listed would give all these species a very great range and raises a question either as to the accuracy of the type localities or as to the correctness of applying the names to the California shells. In spite of the fact that five of the species appear in the California lists as ranging to Panama none of them appear in Zetek's recent list of Panama shells. Until more is known of the off-shore fauna of the West Coast of Mexico and Central America it will be very difficult to answer these questions.

NOTES

CEPHALOPODS OR ELEPHANTS ON THE MAYAN STELE.—In *Nature* for August 2, Dr. H. O. Forbes discusses the supposed elephant sculptures on the stelæ of Copan and Tikal, concluding that they are really conventionalized cephalopods. The illustrations given appear to support his contention, which seems the more probable as squids are already known to enter into the mythology of the natives of Ecuador.

THE MUSKRAT IN CZECHOSLOVAKIA.—*Fiber zibethicus* was introduced in Bohemia in 1906 as a fur animal. It bred with astonishing rapidity, and now threatens the balance of the fresh-water fauna. It is a serious enemy of the mussels, especially the pearl mussel, *Margaritana margaritifera*, which it destroys by gnawing through the shell over the posterior adductor muscle. H. Prell, in *Die Naturwissenschaften*, Sept. 12, 1824, has given an account of its ravages.

FRIEDRICH BORCHERDING.—A sketch, bibliography and portrait appeared in *Archiv für Molluskenkunde*, 1924, pp. 58–66. Borcherding died March 4th, at the age of 75. He was known to American conchologists chiefly for his work on the Achatinellidae of Molokai, and his monograph of *Carelia*.

LAKE TITICACA MOLLUSKS.—Since the publication of my paper on Mollusks of Lake Titicaca (Proc. A. N. S. Phila., 1924, pp. 49–54) I have seen a work in which certain species are illustrated: Eine Prähistorische Metropole in Südamerica, by Arthur Posnansky (Berlin, 1914). On plate II, of Vol. I, there are photographic figures said to represent *Paludestrina culminea*, *P. andecola*, *Ancylus titiacensis* and *Planorbis titicacensis*, no authorities given. The first two are the species so named by d'Orbigny. The *Planorbis* is probably *P. titicacensis* of Clessin. The "Ancylus" *titiacensis* is a *Pisidium*! Whether it is identical with my *Pisidium titicacense* can hardly be decided, but it is at least quite similar. The shells are mentioned on pages

33 and 34, but without descriptions or references. A species of *Hippocampus* is also figured from the lake.—H. A. PILSBRY.

ACANTHINA.—In preparing my “Notes on the Acanthina from California” published in the NAUTILUS for July, 1924, I overlooked a recent paper published in the Proceedings of the Malacological Society of London, August, 1918. In this paper “On the Radula of the genus Acanthina, G. Fisher”, by Rev. A. H. Cooke, a new subgenus *Acanthinucella* is proposed for the California shells and it is pointed out that *Monoceros unicarinata* Sby., has priority over *Monoceros engonata* Conr. Our old friend *Monoceros engonata* Conr. therefore becomes *Acanthina (Acanthinucella) spirata* Blainv., var. *unicarinata* Sby.—A. M. STRONG.

SEA GULL DROPS CLAM ON POLICEMAN.—The habit of sea gulls to carry clams in their talons to a considerable height and drop them on a hard surface to break, so that the bird can feed on the bivalve, nearly proved disastrous to Abe Loche, a former policeman of Atlantic City, N. J.

Loche was walking along the Boardwalk when one of the gulls flew high above him and dropped the clam directly on the man's head. He fell and had to be carried into a nearby drug store for treatment.—*Boston Globe*.

SHELLS WANTED.—Mr. E. E. Hand, of the Hyde Park High School, Chicago, would like to exchange with other High Schools. Also to receive as gifts or will pay for common species in lots of 50 or 100.

HELMINTHOGLYPTA UMBILICATA CAYUCOSENSIS.—A subspecies or local race of *H. umbilicata* has been found by Mr. E. P. Chace and Mrs. Chace on bluffs six miles north of Cayucos, San Luis Obispo Co., Cal. “The exact locality is the face of the ocean bluff almost within reach of the spray, near ‘China Camp,’ A. R. Storni ranch. The snails were living under the beach aster and hen-and-chicken plants. The bluff at this

point is about 40 ft. high, the lower half rock, the upper clayey loam."

This race differs from *umbilicata* by the smaller umbilicus, contained 11 to 16 times in the diameter of shell, by the dark color, between russet and cinnamon-brown of Ridgway (while the typical *H. umbilicata* is from old gold to isabella color). When denuded it is very close to pecan brown. The banding is similar, the dark band being darker than Ridgway's carob brown. It is profusely malleate, as in *umbilicata*. Height 16, diam. 25.5 mm., 6 whorls (type, No. 134843), or somewhat smaller, height 14.7, diam. 22.3 mm.—H. A. PILSBRY.

AMBLEMA NEISLERI NEST LOCATED.—In 1918 Mr. L. S. Frier-
son sent me some money to be used toward finding the rare
Amblema neisleri (Lea). This was after he had examined a
specimen the writer sent him from Florida for identification,
and I think he stated it was the first specimen he had ever
seen. Well, I used his money several times over since then in
the endeavor to locate them, and it is only within the last few
weeks that a nice little lot of choice specimens was received
from a fisherman up on the Chipola River in northwest Florida.
These came accompanied with *Amblema boykiniana* (Lea) and
Elliptio incrassatus (Lea), very fine specimens of both. As long
as they last I will send a few specimens of the *neisleri* to anyone
desiring them.—T. VAN HYNING, Director, The Florida State
Museum, Gainesville, Florida.

PHYSA CUPRAEONITENS AND PHYSA SAYI WARRENIANA IN HOT SPRINGS.—*Physa cupraeonitens* was described by Professor T. D. A. Cockerell in 1889, from Wellsville Hot Springs, Colorado. Since then it has been "lost" to science. Last September I was able to stop for a few moments in passing the type locality in an automobile, and found the species still abundant both in the spring where it issues from the tunnel in the rocks and in the rivulet that comes from the bathing pool just below the spring. The water is quite warm, but, though it is called a hot spring, I would hardly speak of it as really hot.

One might easily suppose the small size of this species to be due to its warm-water habitat, but that seems to be discredited by another species in much hotter water that we found on the same trip. In a spring a short distance above the bathhouse at Mount Princeton (formerly Hortense) Hot Springs, southwest of Nathrop, about twenty miles up the river from Wellsville, we found in fair abundance a species determined by Dr. Bryant Walker as *Physa sayi warreniana*. They are smaller, but not much so, than specimens from elsewhere. The water of this spring was quite uncomfortably hot. In the still hotter water of the big spring at the bath house we found no mollusks at all.

Unfortunately we had no way of taking the temperature of any of these springs, hence cannot make as definite a report as the records of mollusks in hot springs, especially in Europe, cited by Dr. Brues in his recent paper on animal life in the thermal waters of Yellowstone Park (Proc. Amer. Acad. Arts and Sciences, LXI, 371-437, 1924).—JUNIUS HENDERSON.

PUBLICATIONS RECEIVED.

SYSTEMATISCHE INDEX DER REZENTEN CYPRÆIDÆ, Dr. Phil. F. A. Schilder; Archiv. für Naturgeschichte, 90 Jahrg. heft 4, pp. 179-214, Berlin.

KRITISCHES VERZEICHNIS DER REZENTEN UND FOSSILEN CYPRÆEN, von F. A. Schilder. Abh. d. Archiv. für Molluskunde, Bd. 1, heft 2, pp. 1-192, Frankfurt am Main, 1924.

In the first paper above noted, Dr. F. A. Schilder has reviewed the whole family of Cypræidae, in which he includes also the Amphiperasidæ and Triviidæ. He divides this group into five subfamilies, twenty-three genera, and fourteen subgenera. He includes *Pedicularia* in the Amphiperasinæ. He gives a useful list of the fossil forms, the earliest of which, *Cypræorbis gemmeluroi*, appears in the Jura. This is followed by a condensed systematic Catalogue with the synonymy approved by the author.

The second paper, after eight pages of introduction, gives seventy-two pages to a bibliography of the literature relating to the family, followed by an alphabetical synonymic list of species and a two-page addendum of additional matter which came too late to be incorporated in the original paper.

It will be seen from this brief summary that the author's point of view is similar to that of Cossmann, in that it subordinates everything to a strictly conchological arrangement, without reference to distinctions indicated by anatomical characters, basing the classification entirely upon the form of the shell.

Notwithstanding the fact that many malacologists will take a different view, the data brought together with so much labor cannot fail to be of service to any one interested in the classification of the group, and to earn their gratitude to the compiler.
—W. H. DALL.

MARINE SHELLS OF PUGET SOUND AND VICINITY. By Ida Shepard Oldroyd (Publications Puget Sound Biol. Sta., vol. 4, 271 pages, 49 plates, 1924). This will prove to be one of the most useful publications on the West Coast shells ever produced. Correlating descriptions and bringing the nomenclature up to date of the fauna of a given area, is a useful and commendable piece of work, and will do much to increase the general interest in conchology. The illustrations for the most part are excellent.—C. W. J.

NEW SPECIES OF MOLLUSKS OF THE GENUS CHILINA. By Wm. B. Marshall (Proc. U. S. Nat. Mus., vol. 66, art. 13, pp. 1-5, pl. 1, 1924). Seven new species are described.

NEW MOLLUSKS FROM SANTA ELENA BAY, ECUADOR. By Paul Bartsch (Proc. U. S. Nat. Mus., vol. 66, art. 14, pp. 1-9, pls. 1-2, 1924). Fourteen new species of Pyramidellidae and Melanellidae are described.

NEW SPECIES OF FERRISSIA FROM LOWER CALIFORNIA. By Bryant Walker (Jour. Wash. Acad. Sci., vol. 14, pp. 430-432, 1924). Two new species, *F. bayacalifornica* and *F. occidentalis*, both figured.

A DRIVE FOR THE NAUTILUS.

Mr. Hand's suggestion in his article about a DRIVE, seems appropriate also to THE NAUTILUS, for certainly "results are inadequate." THE NAUTILUS, like all scientific journals, was "hard hit" by the Great War. We lost most of our foreign subscribers, and the increase in the cost of printing making a raise in the subscription price necessary, had unfortunate results at home: we now have fewer subscribers than in 1915.

In one of our appeals we spoke of discontinuing the paper unless there was some improvement in conditions. After this we noticed that several subscribers did not pay their subscriptions. Finally when they did, one apologized for his delay, saying, "I would have sent it before but thought you might stop publishing." Compare this with an English friend who always sends three years in advance. He has faith in THE NAUTILUS and in American Science.

There seems to be for Conchology a great field for missionary work. There are seventeen states which are not represented on the subscription list of THE NAUTILUS. The figures for our large cities are still more surprising: 41 of the cities in the United States which have over 100,000 inhabitants, not one of whom is sufficiently interested in Conchology to feel the need of our valuable paper.

For the past thirty-five years the present editors of THE NAUTILUS have done the work and paid the deficits cheerfully. These deficits would have been larger but for the generosity of a few contributors who have paid the bills for their illustrations. Our last appeal, October, 1922, was written in rather a jocular vein, to keep up our spirits. It was evidently taken as a joke, few subscribers responding. The question of continuing THE NAUTILUS is now up to you. The DRIVE is on. *We must have 50 new subscribers before May 1st.* The editors will do their part, but all those who love to study the Mollusca *must* do theirs too, otherwise the *Nautilus americanus* cannot build its 39th septum.
—H. A. P. AND C. W. J.



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ON A TANGANYIKA BEACH

BY CHARLES HEDLEY

It is not the sea, one told oneself; but the other self insisted that it was, pointing to the level horizon where sky and water meet, to the waves rippling with the familiar song upon the sand, to the wide beach overgrown with sea-convolvulus and even to the sea gulls flying overhead. A glimpse of reeds and papyrus growing off shore is a help to appreciate that this is indeed a lake.

Not being the sea, to what can it be compared? The lake front at Chicago is recalled by the beach, the waves and the horizon. But beyond the Tanganyika beach rise range beyond range till the eye rests on an eight thousand foot mountain in the blue and hazy distance. Happily does Burton's phrase of "the loveliest glimpses of the Mediterranean" express it. But against the Mediterranean background is set a foreground which might belong to New Guinea or Tahiti, a group of blacks at play upon the shore, hills sloping steeply to the sea, green with banana plantations, dotted with brown thatched huts and flagged with palms.

In clear weather, for now is the rainy season, the hills may be seen across the lake which is only forty miles wide, though it stretches north and south for 450 miles. The surface is

2500 feet above the sea while the depth is incredible; four thousand feet is a published record, but a Belgian officer informs me (I know not on what authority) that it extends half as far again to two thousand metres. The former record exceeds the depth of any lake in the world except Lake Baikal in Siberia.

Lake Tanganyika has the narrowest zone of internal drainage, the few small streams entering it being incapable of carrying down much sediment. The exit is a small stream which runs west to the Congo. This lake then has a promise of immortality beyond any other lake whose destiny is either to be filled in by tributaries or breached and drained by exit streams. Yet it was once larger, for all around are inland cliffs composed of lake deposit and separated by a level terrace from the water.

Lake Tanganyika lies in the Great Rift Valley of Africa. This is a huge crack in the crust of the earth which dates back at least to the Cretaceous epoch. It runs for several thousand miles from the Jordan Valley in Syria through the Red Sea, Lakes Rudolph, Tanganyika and Nyassa to Cape Corrientes in South Africa.

Water in the lower strata of the lake is said to be salt. Since more water is received and evaporated by the lake than is spilled into the Congo basin, the salinity of the lake is probably increasing. My neighbor at the hotel table tells me that even the surface water is unwholesome and should not be drunk unless boiled. He also cautioned me to be careful when collecting along the beach because there are numerous and ferocious crocodiles which often snatch and kill the negroes. So impatient was I to see at last the wonderful shells of Tanganyika in their home, that I could scarcely wait till I had secured a room at the hotel and despatched a meal, before making for the lake side. When I reached it there appeared along the water side a long swathe of storm-tossed shells. These were, if I remember right, the *Neothauma*, large and solid gasteropods, some purple, some yellow, some ovate conical, some with a broad sutural furrow that recalled Eburna. This, which perhaps is a derivative of *Vivipara*, is a dominant form and continued in great abundance as far as my promenade extended. It was obvious that the molluses lived close by within the sweep of the waves.

The exit of the Lukuga River was not far off and as it seemed promising I walked across to it. Over a broad flood plain at the river bank were scattered great quantities of shells. Among them a large river mussel, *Iridina*, was conspicuous. On picking it up, there appeared a taxodont hinge, something strange to find in a river mussel. Where the shells were thickest I sat down to make a closer search. As I did so, I remembered being warned at the hotel that just here was where the biting flies might inflict the sleeping sickness on their victims and resolved not to linger long. The first thing I found was a large solid Melania-like shell, *Paramelania*, which brought the picture of it in Smith's paper at once to mind. Then I was rewarded with one after another of its associates. A Nassoid shell, *Edgaria*, was the most abundant; this seemed to exhibit endless variation of color, form and sculpture. There may have been several species in a handful that I gathered, but a hasty glance could distinguish no consistent features. A glossy white Naticoid was the next to attract attention, this and a rarer Crepiduloid species (*Spekia*) seemed the most un-lacustrine shells imaginable. Then I found a brown shell with a white zone, for all the world like a *Planaxis*, that on a coral beach would have appeared quite conformable. Most eccentric of all was a tiny white acicular shell (*Syrnolopsis*) like *Eulima* but with the plait of *Pyramidella*. These were quite common when the proper place was reached. Not one *Tiphobia* did I see; its absence is accountable by the deeper water that it is said to inhabit. Mixed with the thalassoid shells were a few ordinary fluvial types, *Lymnaea*, *Planorbis* and *Ampullaria*. There were also a few land shells carried down by the storm water.

This hasty glimpse at the Thalassoid fauna of Tanganyika was ample reward for much wearisome travel. An impression remained of the extraordinary dissimilarity between this and any other fauna, and hence of its probable extreme antiquity. The lake presents itself as a refuge where biological conditions may have remained unchanged for a prolonged period. While the thalassoids slept in Tanganyika their contemporaries may have perished elsewhere through foreign competition and change of temperature and of other physical conditions. Elsewhere liv-

ing fossils like Nautilus and Trigonia linger here and there, but in Tanganyika we seem to see not odd members but a whole association of species preserved beyond the common span.

Albertville, Tanganyika, Congo-Belge, Central Africa.

February 9, 1925.

NOTES ON THE NOMENCLATURE OF SOME OF OUR EAST AMERICAN
SPECIES OF PECTEN WITH DESCRIPTIONS OF NEW SPECIES

BY W. H. DALL

There has been in the past some confusion in regard to the names of our more common species of *Pecten*, and in revising the series in the National Museum, it seemed desirable to put them on a sound basis by scrutinizing carefully the original sources. This has led to the cleaning up of some doubtful points as will be seen by the following data.

Pecten (Placopecten) grandis Solander

Ostrea grandis Solander, Portland Cat., p. 50, No. 486; p. 99,
No. 2168, 1786.

Ostrea magellanica Gmelin, Syst. Nat., p. 3317, 1792.

Pecten tenuicostatus Mighels, Proc. Boston Soc. Nat. Hist. IV,
p. 41, pl. 4, fig. 7, 1842 (young shell).

Pecten fuscus Linsley, Am. Journ. Sci., vol. 48, p. 276, 1845
(nude name); Gould, Am. Jour. Sci., 2nd ser. VI, p. 235,
fig. 6, Sept., 1848 (young shell). Not *fuscus* of Gmelin, 1792.

Pecten brunneus Stimpson, New England Shells, p. 48, 1851
(new name for *P. fuscus* Linsley).

Pecten (Placopecten) clintonius Verrill, Trans. Conn. Acad. VI,
p. 261, 1884 (not of Say).

Pecten (Placopecten) grandis Dall, Trans. Wagner Inst. III, pt.
4, p. 727, 1898.

This species has been dredged in rather deep water from Labrador to points off Cape Hatteras, North Carolina.

There is a marked difference between varieties of this species; the young form has the radiating sculpture minutely imbricate, a feature which is sometimes persistent in the adult, while in the majority of specimens the imbrication is wanting after ado-

lescence. In color the species varies from pale to dark purplish, rare individuals show dark and pale radiations.

Pecten (Plagioctenium) gibbus Linné

Ostrea gibba Linné, Syst. Nat. ed. X, p. 698, 1758.

Ostrea flabellum Gmelin, Syst. Nat., p. 3321; 1792 (after Regenfuss, Conch. I, pl. 9, fig. 33).

Pecten lineolaris Lamarck, An. s. Vert. VI, p. 166, No. 12, 1819.

Pecten dislocatus Say, Journ. Acad. Nat. Sci. Phila., 1st ser. II, p. 260, 1822; Am. Conch., pt. 6, pl. 56, figs. 2, 2a, 1834 (Encycl. Méth. pl. 213, fig. 3, not named), Binney's Say, p. 214, pl. 56, f. 2, 2a 1858.

Pecten purpuratus Conrad, Am. Marine Conch., p. 10, pl. 2, fig. 1, 1831; not of Lamarck, An. s. Vert. VI, p. 165, 1819.

Pecten (Plagioctenium) gibbus Dall, Trans. Wagner Inst. III, pt. 4, p. 745, 1898.

Found in comparatively shallow water from North Carolina to the Antilles.

This is the common *Pecten* of the southern shores from the Carolinas to the Antilles. It varies in color to a remarkable extent, but never reaches the size of its northern relatives.

Pecten sowerbi Guilding, 1826, is supposed to be one of the Antillean color varieties. The number of ribs in the typical form averages twenty, none examined had less than eighteen and only one out of 154 had as many as twenty-three. A specimen from West Africa is exactly matched by one from Florida, though the African form seems to show few of the brilliant colors common with the Antillean varieties.

Pecten gibbus, variety *amplicostatus* Dall

Pecten gibbus, var. *amplicostatus* Dall, Trans. Wagner Inst. III, pt. 4, p. 747, 1898. Texas Coast to Carthagena.

This is a larger and heavier form than the typical *gibbus*. It has from twelve to fifteen strong flattish ribs and all the specimens seen have the lower valve white and the upper valve of a grayish color. It is also found in the Florida Pliocene.

After study of a multitude of specimens, I am now inclined to separate specifically from *P. gibbus* the forms formerly regarded as variety *nucleus* and *irradians*. This was also Stimp-

son's opinion, expressed in his unpublished manuscript in my possession.

Pecten (Plagioctenium) irradians Lam.

Pecten irradians Lamarck, Ann. s. Vert. VI, p. 173, 1819; Chenu, Ill. Conch. III, p. 8, pl. 39, figs. 10, 11, 1843; Sowerby, Thes. Conch., *Pecten*, p. 62, pl. 17, figs. 139, 140, 1842; Reeve, Conch. Icon., *Pecten*, pl. 6, fig. 26, 1852; W. G. Binney's Gould's Invert. Mass., fig. 496, 1870. Not of Potiez et Michaud, Gal. de Douai, II, p. 87, pl. 91, fig. 6, 1844.

Pecten concentricus var. *borealis* Say, Journ. Acad. Nat. Sci. Phila. II, p. 260, 1822.

Pecten concentricus Conrad, Am. Marine Conch., pt. 1, p. 8, pl. 1, figs. 2, 3, 1831; Gould, Invert. Mass., p. 134, fig. 88, 1841; not of Say.

Pecten turgidus Sowerby, Genera, Rec. and Fossil Shells, pt. 31, fig. 1, 1825; not of Gmelin, 1792.

Pecten (Plagioctenium) gibbus borealis Johnson, Fauna of New England, Moll., p. 29.

Ranging from Nova Scotia to Florida and Texas, but abundant only to the northward.

This is the characteristic New England form, large, thin shelled, rather compressed, gray and white with rarely a dull red, yellow or brownish variation, the ribs averaging 17 to 20, the basal margin with prominently acute scalloping.

Potiez and Michaud describe this shell as having an imbricate elevated thread in the channels between the ribs, which never occurs in this species. Their text says it has twenty ribs, but their figure shows twenty-eight.

In the south, perhaps by hybridization, the valves sometimes take on a more inflated form and heavier shell, intermediate between the northern form and the variety *concentricus*, usually with a larger number of ribs than in the latter form.

Pecten irradians var. *concentricus* Say

Pecten concentricus Say, Journ. Acad. Nat. Sci. Phila., 1st ser. II, p. 259, 1822.

Coast of New Jersey to Hog Island, Eastern shore of Virginia, and South Carolina.

This form which agrees closely with Say's description, differs

from the typical *irradians* by being more inflated, more solid, with rather uniformly seventeen ribs, the lower valve is yellowish, sometimes slightly zoned with gray, the upper pretty uniformly bluish gray and somewhat flatter, the incremental lines prominent; the valves are white inside, sometimes blotched toward the margin with reddish brown. Full grown specimens have a length parallel to the hinge line of about 70 mm., and a diameter of 45 mm. This variety does not seem to have been figured.

Pecten (Plagioctenium) nucleus Born

Ostrea nucleus Born, Index Mus. Caes, p. 92, 1778; Test. Mus. Vind., p. 107, pl. 7, fig. 2, 1780.

Ostrea turgida Gmelin, Syst. Nat. p. 3327, 1792 (after Chemnitz, Conch. Cab. VIII, p. 323, pl. 65, figs. 621, *a-b*, 1784). (Not of Sowerby, Genera, pt. 31, pl. 1, fig. 1, 1825).

Pecten nucleus Sowerby, Thes. Conch., *Pecten*, pl. 14, fig. 25, 1842; Reeve, Conch. Icon., *Pecten*, pl. 22, fig. 89, 1853.

Florida Keys to Venezuela.

Having examined a very large number of these shells, I find them exceedingly uniform in size and coloration, showing none of the bright colors of young *P. gibbus*, but maculated gray and white, sometimes both valves, but the lower valve is usually pure white. The shells are well inflated and thinner than young *gibbus* of the same size.

Pecten (Euvola) tereinus n. sp.

Shell small for the group, depressed, thin, pale, the colors when present delicate; the lower valve with about twenty-five low flattened ribs, with shallow not channeled interspaces, or with the ribs obsolete altogether, or ill defined; concentric sculpture weak; the ears subequal, hardly sculptured, the byssal notch shallow, with no ctenolium; internally the valve is white, the grooves corresponding to the ribs, extend over the whole disk and are well defined; upper valve flat or slightly concave, with about 19 narrow elevated not dichotomous ribs with wider interspaces; the concentric sculpture well marked; this valve is usually more effectively colored than the other; internally it is grooved like the other; the outline of the shell

is nearly circular, the hingeline short, the cartilage pit very small; height 28; length of valves 30; of hingeline 19; diameter 4 mm. U. S. Nat. Mus. Cat. No. 333632.

Miami Florida, to the Bahamas and south to Cape Roque, Brazil. The type specimen was dredged off Key West at station 3318 of the U. S. Fish Commission, in 45 fathoms, coral, bottom temperature 75° F.

This species differs from *P. raveneli*, its nearest relative, in the obsolescence of the external ribbing, the absence of channelling and color in the spaces between the ribs; in the depressed form, and in the production of the internal grooving over the whole disk, while in *P. raveneli* it is confined to the more marginal portion. This latter feature is probably due to the thinner shell in *P. tereinus*. The coloration is uniformly more delicate and paler.

Pecten (Euvola) raveneli Dall

Pecten (Euvola) raveneli Dall, Trans. Wagner Inst. III, pt. 4, p. 721, pl. 29, fig. 10, 1898 (Pliocene).

Pecten medius of American catalogues.

The Antillean shell which has been commonly identified with *P. medius* Lamarck, is really a different species.

Ostrea (Pecten) medius Gmelin (Syst. Nat. 3330), based on Gualtieri's figures N, O, on plate 74, is really unidentifiable, but bears some resemblance to *Pecten fricatus* Reeve. *Pecten medius* Lamarck (An. s. Vert. VI, p. 163, 1819), is based on Chemnitz (Conch. Cab. VII, pl. 60, figs. 586-7) who states that his shell was received from Forskal who collected it in the Red Sea. The name *medius* in this connection is preoccupied by Gmelin. Sowerby in the Thesaurus states that his *P. medius* Lamarck, was labeled *P. laticostatus* in the British Museum collection. But this name is preoccupied by Lamarck for a fossil species, "the largest known *Pecten*," a giant eight inches in breadth. None of the figures attributed to *P. medius* Lamarck can be identified with the true West Indian shell; Reeve especially (Conch. Icon., fig. 44) gives a large figure which is neither Lamarck's *P. medius* nor a West Indian species. Apparently none of the authors who have copied references

from one another and applied them to various different species were acquainted with our shell, at any rate they have not figured it. A description follows, since the Pliocene form has lost its color.

Shell of moderate size, thin, the lower valve much inflated, the upper valve slightly concave or nearly flat; the latter with a straight hingeline and almost exactly equal ears, each with four or five subequal minutely imbricate radial ridges; radial sculpture of the disk about twenty-five low-rounded ribs with sub-equal interspaces in which toward the margin traces of incipient intercalary threads may appear; the concentric sculpture is of prominent fine low lamellae overrunning the whole surface; internally the ears are prominent, the margin deeply radially grooved, the grooves extending about halfway over the disk, the wider interspaces flattish, with paired elevated lines at their margins; the hingeline is finely cross-striated, with a groove on each side of the cartilage pit to receive a slender lateral ridge from the opposite valve. The lower valve is pale with about twenty-six strong flattish radial ribs with narrower channeled interspaces faintly marked with concentric incremental lines; the ribs toward the margin are in adult shells divided by a shallow median groove; in many specimens the interspaces between the ribs are marked with a conspicuous brown line; the ears are subequal, somewhat reflexed and feebly sculptured; there is only a shallow byssal notch without a ctenolium; the internal grooving resembles that of the other valve but extends somewhat further toward the umbo; the basal margin is notched by the sculpture; height of shell, 40; length, 47; length of hingeline, 24; diameter, 12 mm. U. S. Nat. Mus. Cat. No. 333634.

The shell described was collected by Captain Jefferson Moser, U. S. N., at St. Martin's Reef, Florida, in three fathoms. The range of the recent form is indicated by specimens from North Carolina and Bermuda to Porto Rico, in the Museum collection.

The coloration is mostly white and pinkish, often with brownish lines in the grooves of the lower valve. The interior is usually white, with more or less color around the margin.

The Pliocene form to which the name *raveneli* was first ap-

plied is somewhat coarser than its recent representative, but I think there can be little doubt of their specific identity.

Pecten (Chlamys) ornatus Lamarck

?*Ostrea sauciata* Gmelin, Syst. Nat. p. 3328, 1792, after Chemnitz, Conch. Cab. VII, pl. 69, fig. H, 1783. Dillwyn, Rec. Shells 1, p. 161, 1817.

?*Ostrea crenulata* Gmelin, Syst. Nat. p. 3329, 1792, after Lister, pl. 175, fig. 12a. (left).

Pecten ornatus Lamarck, An. s. Vert. VII, p. 176, No. 50, 1819; Conrad, Am. Marine Conch. pt. 1, p. 12, fig. 3, 1831; Sowerby, Thes. Conch., *Pecten* pl. 14, figs. 77-78, 1842; Reeve, Conch. Icon., *Pecten*, pl. 19, fig. 68, 1853.

Chemnitz's figure 69 is poor and the species can hardly be regarded as identifiable. *Ostrea crenulata* Gmelin is referred by Dillwyn to the *P. radula* of authors, the largest figure on Lister's plate; but Gmelin's reference is apparently for the left lower figure of Lister, which seems to represent our shell. However some doubt must attach to this identification.

The first positively identifiable name for this species is Lamarck's *ornatus* for which he cites the same figure of Lister as that used by Gmelin for *O. crenulata*.

This shell is white, elegantly sparsely spotted with purple, the ribs are usually worn smooth and rather strong, though originally they were covered with extremely fragile cup-like imbricating lamellae which are very rarely intact. Of the 20 ribs, three are usually untouched by the purple color. The posterior ear is almost obsolete. Our largest specimen is about 26 mm. in height.

Pecten (Chlamys) sentis Reeve

?*Pecten sentis* Reeve, Conch. Icon., *Pecten*, pl. XXIX, fig. 125, 1853.

Pecten ornatus (var.) most lists of Antillean Pectens.

This is a common south Florida and West Indian shell, usually referred to as *Pecten ornatus* though perfectly distinct when carefully studied. The shell is usually bright scarlet or dull purple, paler toward the umbones, very rarely white or white with maculations or rays. When fully adult it has about forty

fine ribs, more or less alternated, which when unworn carry minute erect low scales which bridge the interspaces and connect laterally with those on the adjacent ribs to a greater or less extent. This sculpture is lost, but leaves traces on most beach specimens. The posterior ear is hardly developed, the anterior much larger. The interior is white, grooves reflecting the external sculpture. The byssal notch is wide and shallow. Both valves are usually similarly colored. Our largest specimen is 36 mm. high, 30 mm. wide, and the pair has a diameter of about 10 mm.

Reeve's shell is obscurely figured and insufficiently described, without a habitat, but as far as the characters given go, they agree with those of this species.

Pecten (Chlamys) liocymatus n. sp.

Shell (right valve) small, oblique, moderately convex, with about 20 low rounded entire ribs with narrower shallow interspaces; the surface somewhat worn, is smooth except for concentric lines of growth which may originally have been more prominent; profile subcircular, the ears small, subequal, with a few radiating threads on the anterior ear; the byssal notch shallow; the interior partly grooved in harmony with the external ribs, the edges of the flat interspaces threaded; hinge line straight, in the right valve with a groove each side of the resilifer to receive a corresponding ridge from the opposite valve, these grooves are sharply cross-striated; height, 30; width of shell, 28; of hinge line, 16; diameter (of right valve), 5 mm. U. S. Nat. Mus. Cat. No. 62290.

Dredged by the U. S. Fish Commission steamer Albatross at station 2604, in 34 fathoms, sand, bottom temperature 79° F., 39 miles off Cape Hatteras, North Carolina; two right valves.

These specimens, perhaps originally white, have been discolored by the action of the sea water. I have not been able to find any species recent or fossil which is at all closely related to this one.

Pecten (Aequipecten) heliacus n. sp.

Shell of moderate size, more or less mottled and zoned in

pinkish and crimson on a white surface, outline subcircular, very slightly oblique; ribs about 20, not dichotomous distally; narrow, almost keeled, with wider interspaces; valves equal, inequilateral, the ears subequal, the byssal notch wide and shallow, with a ctenolium of four teeth; the right valve somewhat paler than the other; the microscopic surface sculpture comprises a row of small pointed scales on top of the ribs, a smaller series on each side of each rib and 3 or 4 much finer prickly threads in the bottom of the channels between the ribs; the interior of the valve is more or less clouded with brownish purple, grooved to correspond to the external ribs, the ends of the flattish interspaces slightly excavated, the resilifer rather large; height, 38; length of valves, 40; of hinge line, 41; diameter, 11 mm. U. S. Nat. Mus. Cat. No. 333635.

Bahamas, *fide* W. F. Webb.

This species has the general appearance of *P. phrygium* Dall, with which it had been placed in the collection, but the microscopic surface is quite different.

Pecten (Aequipecten) acanthodes n. sp.

Shell of moderate size, subcircular, olivaceous brown with small paler mottlings; with 22 minutely spinose ribs, the spines in three subequal rows, with two or three smaller prickly threads in the narrower interspaces, the spines are excavated on the dorsal surface, more prominent laterally and on the upper border of the hinge-line; ears subequal, the anterior slightly larger, both with about five radiating spinose threads; byssal notch shallow, the ctenolium with eight teeth; internally the color and sculpture reflect that of the exterior; the flat interspaces between the grooves marginally threaded; hinge-line cross-striated and feebly longitudinally grooved; height, 32; width of shell, 32; of hinge-line, 26; diameter, 11 mm. U. S. Nat. Mus. Cat. No. 333697.

Range from Southern Florida to the Antilles.

Than *P. exasperatus* this shell is less inflated, wider, and with less prominent spines. All the specimens seen are uniformly colored.

NOTE ON THE NAME OF OUR COMMON OYSTER

BY W. H. DALL

It seems that Solander's name of *elongata* is preoccupied by Born for a different species, so that we can fall back on the familiar *virginica*. The synonymy is as follows:

Ostrea virginica Gmelin, Syst. Nat. p. 3336, 1792.

Ostrea elongata Solander, Portland Cat., p. 55, No. 1303, p. 151, No. 3312, 1786.

Ostrea virginiana Bolten, Mus. Bolt., p. 169, 1798.

Not *Ostrea elongata* Born, Index Mus. Caes., p. 92, 1778; Test. Mus. Vind., p. 103, pl. 6, fig. 2, 1780.

IDENTITY OF PATELLA TENUILIRATA CARPENTER

BY J. R. LE B. TOMLIN

Carpenter described this limpet as *P. (?toreuma) tenuilirata* in the Proc. Zool. Soc. London for 1855, p. 233, without figure, on the strength of specimens in the Cuming collection said to have been collected by Hartweg at Monterey.

The type-lot of three specimens is now before me, and if the shell had been figured there would probably have been little hesitation on the part of subsequent monographers in assigning it to its true position. Carpenter's locality and his tentative reference of his supposed new species to *P. toreuma* Reeve have completely camouflaged the situation.

The three shells are very ordinary, rather worn examples of *Cellana radians* Gmelin, the common New Zealand limpet. The British Museum has more than one series of the real *P. toreuma* Reeve, ex coll. Cuming, also labeled Monterey. This of course is equally erroneous.

SOME LAND SHELLS FROM THE ALEUTIAN ISLANDS, ALASKA

BY G. DALLAS HANNA

The California Academy of Sciences has two fairly extensive collections of land shells from the Aleutian Islands, Alaska, among which there are several species not hitherto recorded from the region. Since their distribution has an important bearing on some biological studies the list seems worth publishing.

One collection was made by Dr. E. C. Van Dyke, entomologist of the University of California. In 1907 he spent considerable time on Unalaska Island and to the westward, and his success in finding minute species is not often duplicated among professed conchologists.

The other collection was made by me in the vicinity of Unalaska at various times when enroute to or from the Pribilof Islands, 1913-1920.

The northwestward extension of what Van Dyke¹ has called the Vancouverian fauna is particularly worthy of note. What he has found among the insects appears to be true also of the land shells.

It is true that Dr. Dall² suspected the occurrence of *Polygyra columbiana* and *Circinaria vancouverensis* at Unalaska to be due to the transplantation of spruce trees from southeast Alaska, but the wide distribution of these snails and other species in that vicinity makes this explanation seem doubtful. If a similar situation did not exist among the insects the accidental planting theory would suffice, perhaps; but it seems very improbable now that so large a number of species of animals would have been thus introduced with the few trees which were brought.

Special search among the small groves of spruce trees on

¹The Distribution of Insects in Western North America, by Edwin C. Van Dyke, Annals Ent. Soc. Amer. Vol. 12, 1919, pp. 1-12. Proc. Calif. Acad. Sci. 4th ser. Vol. 11, 1921, p. 157.

²Dall, NAUTILUS, Vol. 31, 1917, p. 13.

several different occasions failed to reveal any land shells except *Succinea*, *Vitrina* and *Vertigo*. The others were found about the roots of herbaceous vegetation and grasses of the rolling hill country. Dr. Van Dyke's finding of the *Polygyra* at Makushin Bay many miles removed from the transplanted trees strengthens the belief that this and the other species have lived on the Aleutians for a long period of time.

Succinea chrysostoma Westerlund.

Makushin Bay, Unalaska Island; Glacier River, Unalaska Island; Unalaska town; Amoknok Island near Dutch Harbor; Nazan Bay, Atka Island (Van Dyke).

At these localities the species has not attained the large size and beautiful golden color of the shells from St. Paul Island, 200 miles to the northward.

Vertigo modesta Say.

Makushin Bay, Unalaska Island; Unalaska town; Unalaska Island; Dutch Harbor, Amoknok Island; Nazan Bay, Atka Island (Van Dyke); Expedition Island near Unalaska; Hog Island in Broad Bay near Dutch Harbor (G. D. H.).

The large number of specimens from these localities shows considerable variation and a strict identification would probably necessitate putting some of them under the named varieties but my study does not seem to warrant this disposition at present.

Columella alticola (Ingersoll).

Near Unalaska, Unalaska Island (G. D. H.). This appears to be the large boreal form rather than the shorter *edentula* of the eastern United States.

Circinaria vancouverensis (Lea).

Near town of Unalaska, Unalaska Island; Makushin Bay, Unalaska Island; Amoknok Island (Van Dyke); Expedition Island near Unalaska; across straight from Unalaska wharves, Amoknok Island and near town of Dutch Harbor, same island (G. D. H.).

My attention was first called to this species as a resident of

the Unalaska region by Dr. Alex Wetmore, then of the U. S. Biological Survey, who found it there in abundance in 1912. Precise directions led me to the same spot in 1916 where large numbers of the species were found. Many of them had been broken and the animal removed, presumably by fieldmice. Subsequently the species was found widely distributed in the region and abundant in favorable localities.

Pyramidula cronkhitei (Newcomb).

Unalaska town, Unalaska Island; Dutch Harbor, Amoknok Island; Nazan Bay, Atka Island (Van Dyke); Hog Island in Broad Bay near Amoknok Island (G. D. H.).

The species is very abundant in some places and appears to be the same as the form found in the higher mountains of California and northward.

Punctum conspectum (Bland).

Found sparingly on Amoknok Island, at numerous places by both Dr. Van Dyke and me. It has been listed from Unalaska previously.¹

Polygyra columbiana (Lea).

Unalaska Island, several places about Bay; Makushin Bay, Unalaska Island; Amoknok Island, several places (Van Dyke) (G. D. H.).

Many live specimens collected do not appear to differ from those found far southward in the range of the species.

Euconulus fulvus alaskensis Pilsbry.

Unalaska Island, at town; Amoknok Island, near Dutch Harbor (Van Dyke) (G. D. H.); Makushin Bay, Unalaska Island; Nazan Bay, Atka Island (Van Dyke); Hog Island in Broad Bay near Amoknok Island (G. D. H.).

Polita binneyana (Morse).

Unalaska Island, near town; Amoknok Island, near Dutch Harbor (G. D. H.).

¹ Dall, Harriman Alaska Expedition, Vol. 13, 1910, p. 53.

Vitrina alaskana Dall.

Unalaska Island, near town; Amoknok Island, near Dutch Harbor (Van Dyke) (G. D. H.); Makushin Bay, Unalaska Island; Nazan Bay, Atka Island (Van Dyke); Hog Island in Broad Bay, near Amoknok Island (G. D. H.).

Pristiloma arctica (Lehnert).

Near Dutch Harbor, Amoknok Island (Van Dyke) (G. D. H.); Near town, Unalaska Island; Expedition Island near Unalaska (G. D. H.).

Zoogenites harpa (Say).

Near Dutch Harbor, Amoknok Island; near Unalaska town, Unalaska Island; Hog Island in Broad Bay near Amoknok Island (G. D. H.).

Prophysaon andersoni (J. G. Cooper).

Near town of Unalaska, Unalaska Island; many places on Amoknok Island (G. D. H.).

Two color phases of what appears to be this slug are very abundant on both islands mentioned. In the early spring they were collected in large numbers crawling over the dead vegetation where the snow had melted.

LYMNÆA AURICULARIA (LINN.) IN CALIFORNIA

BY G. DALLAS HANNA AND H. WALTON CLARK

The finding of *Lymnaea auricularia* in California during 1924 extends the range of this exotic form several hundred miles to the westward. Its first occurrence in the state was noted in a pool in the Japanese tea garden, in Golden Gate Park, San Francisco (H. W. C.). Later it was found in abundance in the fountain pool at the resort known as Byron Hot Springs, Contra Costa County, California (G. D. H.).

Both of these localities are such to indicate that the mollusks were "planted" in some manner but there is no way to trace positively the source of the original stock.

A clue to the manner of introduction may be found in the fact that it is one of the favorite aquarium snails, and is sold in considerable numbers by dealers in aquariums and aquarium supplies under the name of "African or Paper-shelled Snail." The same people supply aquatic plants, and snail eggs might be easily distributed by these.

An analogous case is furnished by the discovery of several small "Cumberland Terrapin" *Chrysemys elegans*, one of the handsomest of our aquatic turtles, and native to the central states drained by the Mississippi (Indiana, Kentucky, etc.). Large examples of these are found in the markets of Chicago; smaller ones are sold at San Francisco by dealers in pets, under the name of "Japanese" or "Coin" turtles. Many purchasers, finding their pets not thriving in captivity, or becoming tired of them, sometimes bring them as donations to the Steinhardt Aquarium, or apparently release them near or at the pools in the park where they can often be seen basking on stones. All that have been collected thus far had not reached sexual maturity, so that the species may be said to be introduced but not naturalized.

It is probable that *Lymnaea auricularia* may have been carried from place to place in the same manner and for the same reasons. The species is sufficiently known to attract attention still. It is worthy to note that all of the occurrences are of the species living under artificial surroundings. Who will be the first to find it established in a natural body of water? Our specimens are large and handsome, being over 25 mm. in altitude. The periostracum is a light straw color and the shells are much thinner and more diaphanous than the specimens compared from England.

Records of this species in North America are scarce. Baker¹ in 1911 listed it from a greenhouse in Chicago, Illinois, and from Brooklyn, New York. Hannibal in 1912² recorded it from Utah but probably through errors in synonymy. In the same year Henderson³ did find the species in an artificial pond

¹ *Lymnaeidae of North America*, 1911, p. 182.

² *Proc. Mal. Soc. London*, Vol. 10, 1912, p. 140.

³ *NAUTILUS*, Vol. 26, 1912, p. 84.

in Colorado Springs, Colorado. Later¹ he added Dotson Reservoir near Fowler, Colorado, to the known localities.

California Academy of Sciences,

San Francisco, California.

VAGABONDING FOR SHELLS

BY P. S. REMINGTON, JR. AND W. J. CLENCH

The authors have been impelled to write this article because they feel that they have accomplished something of value to conchology, and because they hope that their account of it may induce others to attempt similar trips. The "expedition" was made under the auspices of the Museum of Zoology at the University of Michigan, the expenses of the trip being borne by the Museum and by Dr. Bryant Walker of Detroit. The greater part of the material collected will eventually go to the collections of the above named. Thanks are due to Dr. Walker and to Mr. Calvin Goodrich for help in the way of advice, suggestions as to the best places to collect, and gifts of maps and other equipment. A formal report of the species collected will come out later.

The purposes of the trip were several. In the first place, we wanted to collect as large a series of *Physa* as possible to provide more material for Clench's doctoral thesis, which is on the *Physa* of the U. S. east of the Rocky Mts. We wished to get our *Physa* in alcohol for anatomical study, for there is a scarcity of such material. Secondly, we were anxious to collect through the Tennessee River system, particularly the upper portion, which neither of us had ever seen, and which is one of the richest collecting fields in the country. We also had a list of various places, furnished us by Mr. Goodrich, which was desirable to collect in either because they were new territory, or because they were the locality of certain doubtful species. Most of these we cleaned up. Last, but not least, we were out to get

¹ *NAUTILUS*, Vol. 32, 1918, p. 71, and *Univ. Colo. Studies*, Vol. 13, No. 2, 1924, p. 162.

some Ios. The authors collected shells together as boys, and at that time one of the things we promised ourselves to do some time was to go on a hunt for Ios. This trip promised an opportunity of doing that and of renewing our boyhood memories. Before leaving, Clench prophesied that this year would see the last of the Ios! It wasn't quite so bad as that, but we did succeed in taking several hundred. There are undoubtedly a few left in the French Broad River, which we did not touch. We had carte-blanche as to where we might go, but were guided largely by the above considerations. We left Ann Arbor on July 19 and returned Sept. 8.

In our choice of equipment we were able to profit by the results of a similar trip made the preceding summer by Clench. We bought a 1922 Ford touring car in excellent condition and proceeded to load up the running boards and back seat until it looked like a gypsy outfit. We were handicapped by the fact that we had to carry full camping equipment and supplies as well as the collecting kit. We had a very handy auto tent, two folding cots, two folding chairs, and a folding table. This last was bought because of Clench's experience the summer before, and it was certainly useful. In our grub box we carried cooking utensils and canned food, mainly beans. Both the authors were originally from Boston. We had another large case containing wading boots, sieves, jars, boxes, vials and bags, of which one can't have too many on such a trip. A duffle bag for each of us, a suit case of "civilian" clothes, a dispatch case for papers, a case for toilet articles, a lantern, blanket rolls, water jug, emergency can of gasolene and one of oil, and a container of alcohol filled up the back. We had a very fine two-mantle gasolene lamp which was invaluable. Although the museum appropriation for this trip came largely from the conchology department, we received contributions from the insect and reptile departments, so had to carry along equipment for collecting such specimens. The insect equipment was limited to nets and cyanide jars, but we had to take a large milk can partly filled with formaldehyde to preserve reptiles. The reptiles were put in this to harden and preserve them, then injected and wrapped in gauze and shipped back.

We also had a plant press and a minnow seine. All these things gave us license, when asked our business, to say we were collecting "plants and animals" for the University of Michigan. This was all right till one obliging fellow offered us a pet wood-chuck! Then we hit upon the happy phrase "we are making a Biological Survey." They knew what a survey was anyway.

With all this mass of equipment aboard you would say we must have spent half the day packing and unpacking. It is true that it did take us an hour or more for this operation at first, but before long we evolved a system, so that by the end of the trip we could pack in less than fifteen minutes and make camp in less time than that. We were surely a spectacle and got many a kick out of the reactions of the beholders. Vagabonds indeed!

One of the most enjoyable incidents of the whole trip came at the very start. We left Ann Arbor about nine in the morning "heading south." We collected a little, mainly *Physa*, and reached Toledo in the afternoon, where we hunted up Mr. Calvin Goodrich. He very kindly insisted on our putting up with him, so we had an opportunity to inspect his large collection of *Pleuroceridae* and "talk shop." As the catch where we were going would be largely of that family, we wanted all the "dope" we could get. We had a very enjoyable visit, all too short, for, as Mr. Goodrich remarked, it isn't often that three shell collectors get together.

The next day, Sunday, we set out bright and early bound southwest for Bluffton, Ind. We had heard unfavorable news from Mr. Goodrich that all the rivers in the south were swollen from heavy rains, and that unless they went down we would see very little good collecting. Our original intention was to strike south through Cincinnati and Cumberland Gap to the headwaters of the Tennessee River, then work down to Huntsville, Ala. and then north to Louisville. Upon receipt of this unwelcome news, we decided to reverse the itinerary, so as to reach the heavy collecting last, in the hope that by then the rivers would be low. This turned out to be a wise move.

We camped the first night near Hicksville, Ohio, a half-mile off the main road. We can hear the ringing reply, even now,

of the farmer on whose land we asked permission to camp. "You bet your life you can!" he said. We want to say right here that if the camper is neat-appearing and respectful, and leaves no rubbish or disorder of any kind behind him, he will have no trouble finding a place to camp, and we were not once refused in the whole 1700 miles we traveled. It is usually better to go a little off the main road before camping. One should be very careful about water, and we carried a bottle of Halozone tablets which we usually added to the water. Country folk are always hospitable and often brought us out cake, pie and other dainties.

We were sorry to leave the wonderful concrete roads of Ohio, but we had little to complain of in Indiana. There was very little collecting from Toledo to Bluffton. On the banks of the St. Mary's River at Fort Wayne we found some fine *Succinea avara* Say and a few other land shells. At Bluffton we hunted up Mr. E. B. Williamson, the dragon fly expert, and a member of the museum staff. We were cordially invited to make his home our headquarters for as long as we cared to stay in Bluffton. We were glad to stay two days while we rearranged our outfit, supplied what we found lacking, and collected in the vicinity. We found quite a few *Planorbis*, *Physa*, *Polygyra*, *Succinea* along the Wabash and near by. The river itself was disappointing, because it was in high water. The collection of dragonflies which Mr. Williamson and his brother have gotten together is one of the best in the world, and we learned many pointers from observing their laboratory and field methods. Such precision, accuracy and care of detail are well worthy of copy.

After bidding a cordial farewell to Mr. Williamson and his family, we headed south again. We collected our first lot of *Goniobasis* in the Noland River, two miles west of Centerville, Ind. They were probably *G. semicarinata*, Say. After that, *Pleuroceridae* formed the greater part of our catch. We arrived at Bloomington on the night of the 25th in a pouring rain. It being too wet to make camp and cook a meal in any degree of comfort, we put up at a hotel and after supper took in the local movie and wrote up our field notes. This latter was always a

part of our evening duties, with a study of maps and a plan for the next day's trip.

It may be well here to mention how we kept field notes and cleaned our catch. As soon as we finished collecting at one spot, the entire catch was put in a can or bag and a slip of paper bearing a number put with it. Under the same number this entire lot of shells was entered in a field note-book, with full particulars as to ecologic data, etc. Here is a specimen entry:

"No. 103. *Pleurocera*, *Campeloma*, *Angitrema* and *Anculosa*. Little Tennessee River, Morganton Ferry, Tenn. Along muddy banks and on rocks and shoals. 8/22/24."

That, by the way, was one of the finest lots we ever collected. Our lot numbers ran serially from 1 to 145, the last collected on Sept. 4. On our next trip we shall start with No. 146. Every so often we filled the cans of the last few days' catch with alcohol, usually doing it in the evening. Then, next morning, one of us would stay in camp, empty out the alcohol and dry the lots separately in the sun, while the other collected. At the same time full labels were written out and the shells wrapped up and sent back to the museum as soon as enough for a box had accumulated. We used denatured alcohol, which, while not as good as pure alcohol, is cheap and readily obtainable locally. Later, if it is desired to examine the animal for radula, it can be soaked out. This end of the collecting was not much fun, but very necessary. We are setting it down because some one else may want to adopt it and improve on it. In accounts of collecting trips the authors usually neglect to state how the shells were cared for and sent back, and we have often wondered what methods were followed. John B. Henderson in his "Cruise of the Thos. Berrera" is one of the few exceptions.

Our methods of collecting were very simple. When you see the shells, go in after them. At first we used to pack them up along the edge, walking out on boards and so forth. But after a while we got so that we waded right in after them, shoes, puttees, and all, and our feet and lower limbs were continually wet from one stream to the next and from one day to the next. Yet we never once took cold on the whole trip. Back in camp

we used to put on dry clothes, but pull the wet ones back on in the morning. If the shells were pretty far out and were plentiful, we put on swimming trunks and old boots and went on out.

We struck no really good collecting until about ten miles south of Bloomington, Ind., and then every stream was thick with *Pleurocerids*, *Physa*, and often naiades. We took ten lots of *Pleuroceridae* between Clifty Creek, Columbus, Ind., and the Ohio River at Louisville. We stopped at Mitchell, Ind., a day to inspect the curious cave formations there. In an icy cold stream issuing from Donaldson Cave, we took a shell which resembled *Goniobasis semicarinata*, Say. In the cave itself we hoped to find blind fish, but saw only one and it got away. We did collect two small salamanders. From Mitchell south, the country became very rugged and beautiful, quite a contrast to the extreme flatness of central Indiana. The good ship "Asthma", however, never failed us, in spite of the load she was carrying. In the whole 1700 miles she never gave us any real trouble, although we did change tires seven times one day! But that was on the "boulevards" of Kentucky. It was with real regret that we sold the gallant little car in Knoxville. She should have been put to pasture like all noble steeds.

We collected a fine series of *Goniobasis indianensis* Pils. in the Blue River, taking lots at several points three or four miles apart. This is the type locality for that species. Here we also collected three specimens of what looks very much like an *Anculosa*, but will be determined later. The first stage of our trip ended at Louisville, where we got our accumulated mail, stocked up on beans again, and pulled out for Cave City, Kentucky.

For the first fifteen miles after leaving Louisville we struck concrete roads and were beginning to have a high opinion of Kentucky roads and the Dixie Highway in particular. Then we hit a detour, then more detour, worse than the last, and more of it for about sixty miles. When they repair a road in Kentucky they take the whole stretch at once. Words cannot express the meanness of those roads, and we were so busy "praising" them that we forgot to take pictures of them. We passed near Lincoln's birthplace, and now we know why he

left Kentucky. Furthermore we struck no collecting for about forty miles after leaving Louisville. In a way, we are grateful for those detours, though, because in taking one we were led to one of the richest collecting spots of the whole trip. As we were pounding along in the midst of the hills, we decided to stop a while and cool the engine. Right where we stopped we noticed a sign which said "Visit the dam and eat at Glenbrook Hotel," and an arrow pointing down. "Dam" sounded like water (though it was what we had been saying for many miles), and water meant shells, so down we went, and we certainly found shells. The dam and brook below were plastered with a small black *Goniobasis* and we also took several hundred fine *Physa microstoma* Say out of the pond above. They have dammed up a big spring there for power purposes. As there were also indications of land shells, we drove down and camped beside the hotel for two days while we collected. In the spring above and below the dam and in a neighboring spring we took several quarts of shells, taking care to keep the lots separate. I have never seen shells more plentiful in one spot except in First Creek at Knoxville. We also discovered to our surprise that we were only a hundred yards above Rio on the Green River, so we hastened to get a boat and collect in the river. The Green River, and it is green, was one of the places we wanted to hit, because it has not been collected in above Mammoth Cave to any extent. We took half a dozen species of *Pleuroceridae*, including *Anculosa*, and a fine lot of naiades. Also along the sides of the glen above the spring we found many land shells, *Omphalina*, *Polygyra* of many species, and others. So the detours were not an unmixed blessing; indeed, we found that to get the good shells, one must get off the good roads. So it was with a sense of time well spent that we left Rio.

At Cave City we sent our first shipment north, two big boxes, and then we went out of our way a few miles to see Mammoth Cave. It turned out that this word should be in the plural, for we found on arriving that there were half a dozen caves or more, many said to be more splendid than Old Mammoth. Acting on advice we had received, we spent a morning explor-

ing Great Onyx Cave and count it time well spent. Here also we collected a salamander, mole crickets, and a blind beetle. It was in one of these caves that Call discovered *Carychium stygium*, but we saw none. We also collected again in the Green River here, and then pulled out and set off for Nashville, Tenn.

There was not much collecting till we struck the Cumberland River just above Nashville, and here we took a fine lot of shells, finding *Angitrema* for the first time, big, spiny ones that looked like young *Io*. This was the only day we really suffered with heat and we finally stopped collecting to run into town and cool off at a soda fountain and read our mail. This ended the second stage of our trip.

From Nashville south to Huntsville, Ala. the collecting became very rich, every stream being loaded. It seems that the forecasts and reports of high water were not borne out, for in practically every stream we could wade across and see bottom. In fact, only once on the whole trip did rain so muddy a stream that we could not collect in it. It was an ideal summer from a conchologist's standpoint, for it rained scarcely once throughout the belt we collected in for the whole two months.

The Duck River, which we crossed at Shelbyville proved a big disappointment, for we found only one shell, a naiad. Doubtless this stream is polluted right there. But one mile south of Shelbyville, in a large tributary of Duck River, we found very good collecting. Here we took our first *Anculosa* in quantity, a nodulated species. They were in what we soon found to be their characteristic situation—on the edges or underside of flat rocks in very swift water, usually at the head of a riffle.

The Elk River, one mile south of Fayetteville furnished the best collecting we had so far found. Here from the river itself and from a small slough close by we took about three gallons of *Pleurocera* and *Anculosa*. We also began to get *Campeloma* from now on. A few days before, we took the first *Vivipara* of the trip along the marshy edge of a river one mile north of Murfreesboro. Shortly after leaving this locality we crossed the line into Alabama, and came on into Huntsville. This

town has been made famous by the work of many other collectors, notably H. E. Sargent, H. H. Smith and H. E. Wheeler. The latter in two excellent papers in the *NAUTILUS* gave a list of the shells of Monte Sano, a high plateau overlooking the town. Before going up Monte Sano we collected in the Big Spring in the heart of the town. This spring contained a puzzling species of *Goniobasis*, puzzling because Sargent had distributed it as *G. perstriata*. Goodrich recognized them as *G. nassula* and thought the two names might be synonymous. The shells we found were *G. nassula*, but we turned up the true *G. perstriata* in Spring Creek. It happened that the day we visited the spring men were cleaning out water weeds, so we simply sat down and leisurely picked a box full of the little fellows. In the afternoon we drove up Monte Sano through one of the two toll-gates left in Alabama and camped on top. Next day we devoted to scrambling over the mountain, and found many of the shells listed by Wheeler, but not all, for it had been an exceedingly dry summer and land shells seemed to be very scarce. For the first time in our experience we took *Helicina*. This ended the third stage of our journey.

Our next objective was Chattanooga, Tenn. It was a question whether to take the road up the north bank of the Tennessee, or the south bank. We finally decided on the latter because the road was reported much better. So we turned south till we hit the river at Whitesburg Ferry Landing. Here we found a great quantity of naiades embedded in new wash of the river, all clean, in perfect condition, nacre and hinge unharmed. We took a large series of each species. A little farther on we crossed the Flint River where we spent several hours collecting large numbers of *Vivipara*, *Campeloma*, *Anculosa*, and several species of *Goniobasis* and *Pleurocera*. The river was very muddy, but normally so, no doubt, because there was no trouble getting the shells. We put up for the night at New Hope and collected in Paint Rock River next day. In the deepest parts the river was only breast-high, rock bottom with a layer of silt or gravel, so we put on trunks and covered every foot of the bottom for a half mile. We are quite sure we got every species there, and a nice lot it was. As usual there were

two distinct species of *Pleurocera*, probably more; one, a squat, heavy form found on rocks, the other a longer, slender species found on mud and on logs. We recognized among the naiades such old friends as *Proptera alata* Say and *Leptodea fragilis* Raf. We crossed the Tennessee at Guntersville, turned west over Bear Mountain and then headed north. Albertsville, Ala., was the farthest south we reached. There was very little further collecting till we reached Chattanooga, and in this respect we were sorry we did not take the northern road. The only notable collecting was a good series of a fine, large *Pleurocera* from Lookout Creek about four miles north of Valley Head. On Aug. 13 we rounded Lookout Mountain and entered Chattanooga. This ended the fourth stage of our trip.

At this point Paul J. Adams of Knoxville, Tenn. joined the expedition as an additional collector and stayed with us till the end of the trip. His knowledge of the country around Knoxville and the Great Smoky Mountains was extremely useful to us and enabled us to cover much more ground than we otherwise would have. On the other hand we were able to show him wrinkles about the "shell game," which were new to him. We now began to strike more of the localities which Mr. Goodrich had suggested as desirable to visit, either because these were type localities or represented only by puzzling and inadequate material. We laid out our course especially to hit such places. The first of these was Chickamauga Creek at Lee and Gordon's Mill, just outside the military park. The reason for visiting this was to check up with material from Crawfish Springs in the park which was the type locality for *Pleurocera planicostata*. We found shells plentiful there and collected several quarts. We then drove west to reach the Conasauga River, which is the type locality for eight species of *Goniobasis* alone. We were also anxious to collect in this river because it belongs to the Gulf drainage and for that reason presents a different fauna from that of the Tennessee. The shells did indeed look different from any we had so far seen and we took large lots from two places on the Conasauga, as well as Mill Creek, Coahuila River and several other streams. We recognized among these *Goniobasis murrayensis* Lea—this is its terri-

tory. By accident, while buying postcards in Dalton, Ga., we saw a picture of "Country Club Lake", which was not on the map. Arriving there we found a fine large *Pleurocera* of the lake type. Mr. Goodrich is now working at identifying all this material.

A few miles beyond Dalton we turned north again into Tennessee and went out of our way to visit the Ocoee River dam at Parksville. This dam has backed up the river for ten miles and made a large inland lake; we were interested to see what the shell life would be and we also wanted to collect in the Ocoee, as no shells have been reported from there recently, if at all. We found out why; there *are* no shells in the river. We learned that farther up the river near Ducktown, sulfuric acid was produced as a waste in zinc smelting, and run off into the river. This has completely killed all forms of water life, not even a fish being found. This affects even the Hiwassee River, into which the Ocoee flows, so that we found no shells in either. It was a somewhat new experience, for we had grown so used to finding shells in every creek that we had acquired the habit of piling out of the car, grabbing an empty can and wading right out. At times it almost got monotonous. We climbed a small mountain, Sugar Loaf Hill, beside the dam and found quite a few of the smaller land shells at 1100 feet.

From the dam we drove west to Cleveland, Tenn. There was a *Goniobasis* reported many years ago from a "spring near Cleveland on road to Ducktown" which we wanted to look up, and we also wanted to investigate a small lake, also called "Country Club Lake", shown on the map near the town. We reached the lake just before dark and pitched camp in a grove of pines, the most ideal camping spot of the trip. Next morning we collected thoroughly in the lake and in its inlets and outlets, and took two fine *Goniobasis* and a beautifully-ribbed *Pleurocera* in great quantity. We found a few naiades also. Our catch here was particularly interesting as the lake drains into the Conasauga River. In fact, the ridge just back of the lake was the dividing line between the Conasauga and the Tennessee drainages. About noon we started a hunt for the elusive spring and found it without much trouble. There were a few

of the *Goniobasis*, which we gathered, but did not linger long, for the water was icy cold and quite deep, and typhus was reported by the local hospital.

We now headed north for the Tennessee River at Loudon, which we reached at dusk. Here, at Sam's Island, Dr. C. C. Adams reported large numbers of *Io*, form *loudenensis*, and we were all on fire to diminish the local race. Next morning we borrowed a boat and went down river. At once we began to find *Strephobasis*, *Angitrema*, *Anculosa*, and several *Pleurocera* and *Ancylus*. But no *Io*! The Tennessee was still a little high, however, and we might have had better luck a month later. Finally, one of us did find the first *Io* of the trip, a fine, big *loudenensis*; and he at least will always remember the thrill he felt when he put his hand on those big spines. The thrill never wears off with *Io* even when we later collected several hundred in a day. Although we felt the bottom barehanded for many yards around that spot, a swift rocky shoal, we found no more. So a little after noon we drove north again to Lenoir City where our mail awaited us, stocked up on beans again, and drove northward till we struck the Clinch River at Riley Ferry, not many miles above the mouth. Here again we took only a lone *Io*, but a wonderful catch of naiades, many species, some of which were old friends. Although we saw ideal situations for *Io*, we could find none. Perhaps this is because we had not yet learned how to look for them, or because until the water is very low, they are quite dispersed. There is a trick to *Io* collecting. Later we found the most plentiful on fairly swift shoals, at the head of the riffles and at the end, just under the edges of rocks and smooth ledges, usually spire pointing down stream. Never in water over three feet deep, sometimes partly out of water. This is surely the queen of fresh-water shells.

During the next day we made a loop to the north and collected *Goniobasis* and *Physa* in Bear Creek, Poplar Creek, and several springs, coming out on the Clinch again at Emory River. We camped here and made extensive collections on the shoals, again bagging a lone *Io*, but many *Anculosa*, some knobbed, *Angitrema*, *Strephobasis*, etc. The *Anculosa* were particularly large and fine here.

Leaving Kingston, we struck west to run down another doubtful locality, Cane Creek and Toco Creek near the North Carolina line. We eventually found both of these and neither had any shells at that point. The rapid deforestation has changed the character of these creeks and given them a shifting, sandy bottom unfavorable to shells. Such is liable to be the fate of many other streams; and many others are being dammed for power, also changing the shell life. So they should be surveyed as soon as possible. In getting to these creeks, we followed the Little Tennessee and were amply repaid for our trouble by the rich collecting we got along it. At Coytee Shoals we found *Angitrema*, *Physa*, *Unios*, *Sphaerium*, and a very coccolated *Pleurocera*, while a few miles farther at Morgantown Ferry we made one of our richest hauls—700 very large, fine *Camptoloma*, probably *C. coarctatum* Lea, over 1000 specimens of a giant *Pleurocera* nearly two inches long, and the usual run of *Anculosa*, etc. Although we hunted carefully we found no trace of *Io* in this river, though conditions seemed ideal and some of the natives reported finding "spiny shells" on the shoals. Dr. C. C. Adams and his collectors reported the same lack of success. It would be interesting to follow this up and see if there are any in the head waters.

We examined the Tellico River at two places near Vonore and found a few *Pleurocera*, then headed west again for Sweetwater. Sweetwater Creek was one of the localities we wanted to check up on. It is polluted below the town, but we struck it just above the town, near the pumping station, and not only took a large series of *Pleuroceridae* from the creek itself, but also collected several kinds of *Goniobasis* from Cannon Spring and a small pond close by. This was a good haul.

We now continued north to Lenoir City again, collecting in Turkey Creek en route, and ferried over the Tennessee. We wanted to run into Cades Cove, and climb one of the peaks of the Great Smoky Mountains. This would enable us to cut Little River in many places. We certainly did survey the latter river thoroughly, for we took eight lots out of the river from points extending from near the mouth almost to the source. Our trip into Cades Cove and the hike up Thunder-

head is one of the high lights of the summer. The road into the Cove, while in good shape, is surely the crookedest road in the world, for its length. Coming out we counted 226 turns in ten miles, many of the hairpin variety. This was Paul J. Adams' old stamping ground, and we left our machine in the barn of a friend of his, made up our packs and started on the hike up. These mountains are the highest east of Rockies, and though this one was only about 5,500 feet elevation (Thunder Head), it seemed much more before our tired legs reached the top. The going was made a little easier by picking up an occasional *Polygyra andrewsi* Binn. A dozen of these will fill your pack. Next to *P. chilhoweensis* Lewis, also found in these mountains, this is the queen of the *Polygyras*. Adams assured us that in a wetter season, land shells would have been much more plentiful. We saw far too few. We made the top in a cold fog, and hastened to seek shelter in the cabin of a cattle herder, old Tom Sparks, another friend of Adams. Early in the morning we tumbled out and went up the crown of the mountain just over the North Carolina line where we got a superb view of the rugged peaks. Then back for a hasty breakfast and the long pull down which seemed even harder on the legs than the hike up. Shortly after noon we got back to the car, packed up and pulled out. In packing we missed a bag containing two dozen eggs we had just bought and concluded the farmer's dogs must have gotten them. About a week later, Clench, after much complaint from the other two on the condition of his duffle bag, decided to clean it out and found the whole two dozen where the farmer had put them to be out of reach of his dogs! Curtain! We are still laughing at that.

We now turned north to Knoxville, stopping just once to collect several quarts of big *Pleurocera* from Nale Creek. We were in a hurry now because Clench felt an attack of his old malaria, contracted the previous summer, coming on. When we reached Adams' home in Knoxville, Clench was just able to wobble up to bed. Strong doses of quinine brought him around, however, and two days later he was out collecting again. We cannot express enough gratitude for the kindness and hospitality which the Rev. Mr. and Mrs. Adams showed us then and later.

As soon as Clench was over his attack we made a trip to the Holston River in company with the veteran collector Manley D. Barber, a resident of Knoxville and Rev. Mr. Adams. Mr. Barber promised us some *Io* on a shoals about twelve miles up the Holston, and was able to make good on his promise. For the first time we took *Io* in some quantity, nearly 200, as well as many other shells. These *Ios* were big spiny fellows, possibly typical form *spinosa*. On the way back we collected in Swan Pond Creek and had very good success. While waiting for Clench to get well, trips were made to the Tennessee River, with poor success, and to First Creek with wonderful luck. At the latter place, although the stream was quite cluttered with rubbish, the water was literally crowded with *Pleurocerids*. Never have we seen shells in such quantity. We filled up all our cans and buckets in a short time—we could have filled barrels—and then turned home. It would pay to make a complete survey of that stream, it is so rich, and we hope Adams will do it. Another bit of collecting we did in Knoxville was a search for land shells at Cherokee Bluffs and for *Helix nemoralis* Linn., introduced near the campus of the University of Tennessee. About 100 live specimens of the latter were carried to St. Louis by Remington and "planted" on the grounds of the Principia School.

On Aug. 30 we left Knoxville on the last leg of the trip. Our intention was to collect farther up on the Clench and the Powell and perhaps run into Virginia. We were going after *Io* in quantity now. Leaving Knoxville we collected in Second Creek, Knob Fork Creek and Beaver Creek, and struck the Clinch at Clinton. Here we collected a big series of *Campeloma* and *Pleurocera*. A few miles beyond we again hit the Clinch at the old Moore's Ferry and found the usual run of shells, in quantity, and about 100 *Io*, small, of the form *brevis*. We now headed for the mouth of the Powell River where we wanted to get a big series, as there is some talk of a dam being built there. We found a few *Io* here in both the Clinch and Powell, as well as some fine *Strophobasis*, *Anculosa*, naiades, and the river forms of *Pleurocera*.

Another stop was made on the Clinch near Maynardville,

Tenn. where we secured a fine catch of mussels. Then we made a detour to strike the Powell near Cumberland Gap, and had very good success there. For the first time we took over 100 *Io* which were nearly smooth. It would be hard to say what these shells are, as they intergrade, but they range between form *lyttonensis* and form *powellensis*. We kept zigzagging between the Powell and the Clinch here, until we turned northeast at Tazewell toward Kyle's Ford on the Clinch. A collection made in the Little Sycamore Creek was remarkable for having a few *Anculosa* in it, as well as some forms of *Pleurocerids* new to us. *Anculosa* were not usually found in small creeks. This day we made camp just before a pelting rain caught us. We saw the storm coming and stopped at the first handy spot, but quickly moved after the storm when we found we were camped close to a very dead calf! Once before we found we had camped near a departed mule. We favor a law in Tennessee requiring farmers to bury deceased animals.

We came out on the Clinch about six miles below Kyle's Ford, Tenn. and proceeded to collect all the way up to the ford. The river here is a series of shoals, quite clear, and we could see the *Ios* on the ledges. At Kyle's Ford they were particularly thick, as many as ten being brought up in one scoop of the hand. These *Ios* are from the type locality for the form *brevis*. It was thrilling work, though back-breaking, to grope for shells and keep a footing in the swift water. But our long-awaited dream of collecting *Io* had come true and we chalked off another aim achieved in conchology. We still have a few left. This was the last collecting we did, for our funds were almost exhausted and our time was about up too. Indeed, we had stretched the appropriations for two so as to cover expenses for three, and we considered that good managing. On Sept. 5, we drove back to Knoxville. All that remained now was to dispose of the car, pack our outfit and take the train back to Ann Arbor. The Rev. Mr. Adams kindly took the car off our hands and we were glad to know it was with friends. We feel very tender toward that car. On Sept. 8 we reached Ann Arbor again, having stopped in Detroit a few hours to report to Dr. Walker and spent a pleasant hour with him.

Our work, while very scattering, did approach completeness on the Little and Clinch Rivers—we collected at eleven stations on the latter river. As the upper reaches of the Clinch have been explored by Goodrich and Ortmann, the Clinch may be said to be thoroughly explored now. We estimated that we brought back over 250,000 specimens. Dr. Walker says no such volume of work has ever been done on the *Pleuroceridae* at one time. The whole work was really in the nature of a survey, and when the results are made clear, will furnish a basis for further work later. We want however, to give the Ios time to come out of their hiding places again. It is reported that the canned-bean industry had a big year! A wonderful trip, vagabonding for shells!

PUBLICATIONS RECEIVED

Pelecypoda from the Marine Oligocene of Western North America. By Bruce L. Clark (Univ. Calif. Pub., Bull. Dept. Geol. Sciences, Vol. 15, No. 4, pp. 69-136, pls. 8-22, 1925). Forty-four new species are described and figured with notes and figures of many others.

The fossils of the Lower San Pedro Fauna of the Nob Hill Cut, San Pedro, California. By T. S. Oldroyd (Proc. U. S. Nat. Mus., Vol. 65, Art. 22, pp. 1-39, pls. 1-2, 1924). Twenty-two new species and subspecies are described from this Pleistocene formation which contains some 242 species of shells.

Discovery of a Balkan Fresh-water Fauna in the Idaho Formation of Snake River Valley, Idaho. By W. H. Dall (U. S. Geol. Survey, Prof. Paper 132-G, pp. 109-115, pl. 26, Nov., 1924). Seven new species, including four of the remarkable genus *Orygoceras* are described. A new genus *Payettia* is proposed, type *Latia dalli* White.

OPISTHOBRANCHIATE MOLLUSCA. By Frank M. MacFarland (Proc. Cal. Acad. Sci., 4 Ser., Vol. 13, pp. 389-420, pls. 10-12, Nov., 1924). One new species *Aglaja bakeri* and a new genus *Tridachiella*, type *Tridachia?* *diomedea* are described and figured.

THE BORING MECHANISM OF TEREDO. By Robert C. Miller (Univ. Cal. Publications Zool., Vol. 26, pp. 41-80, pls. 3-6, 1924). An interesting paper on a much discussed subject.

WOOD-BORING MOLLUSKS FROM THE HAWAIIAN, Samoan and Philipine Islands. By Robert C. Miller (Univ. Cal. Pub. Zool., Vol. 26, pp. 145-158, pls. 8-11, 1924). Three new species—*Teredo furcillatus*, *T. samoensis*, and *T. trullifermis* are described and figured.

CONDITIONS UNDER WHICH GONIOBOSIS LIVESCENS OCCURS IN THE ISLAND REGION OF LAKE ERIE. By Frederick H. Krecker (Ohio Jour. Sci., Vol. 24, pp. 299-310, 1924).

NOTES

ON THE TYPE LOCALITY OF *Polygyra townsendiana brunnea*.—Mr. Walter Eyerdam of Seattle, Washington, writes that he collected the types of *Polygyra townsendiana brunnea* Vanatta at Coal Creek, a small branch of Cowlitz River, which flows into the Columbia River about ten miles south of Kelso, Cowlitz County, Washington. It was described in the Proc. Acad. Nat. Sci. Philada, Vol. 76, 1924, p. 25, as being from along the Columbia River near Kelso.—E. G. Vanatta.

PROFESSOR T. D. A. COCKERELL and Mrs. Cockerell expect to visit Argentina during the summer. Fossil insects will be their primary object, but mollusks are also to be collected.

The Twenty-fifth Anniversary of the Conchological Section of the Buffalo Society of Natural Sciences was celebrated on Tuesday, October 23, 1924. Covers were laid for sixty guests. The President of the Section, Miss Mary E. Walker, has served in that office most of the quarter century; the Section having been founded by Miss Elizabeth J. Letson (Mrs. William Alanson Bryan). The Rev. George F. Williams acted as toastmaster. Responses dealing with conchological topics of general interest, reminiscenses of early days and adventures of the club, poems in appreciation of shells and other topics appropriate to the occasion were made by Messrs. Chauncey J. Hamlin, Henry R. Rowland, John E. Andrews, Dr. W. L. Phillips and Mrs. Burr H. Nicholls. The chief address of the evening was by Dr. Bryant Walker, whose subject was "Mollusks and Disease."

The Section has 29 Active Members, 7 Associates and 5 Honorary Members. Monthly meetings are held from September to May, with papers on conchological and other natural history and cognate subjects. Long life to the Buffalo Conchological Section!

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OF CONCHOLOGISTS

EDITORS AND PUBLISHERS:

H. A. PILSBRY, Special Curator of the Department of Mollusca,
Academy of Natural Sciences, Philadelphia.

C. W. JOHNSON, Curator of the Boston Society of Natural History.

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Vol. XXXVIII.

OCTOBER, 1924.

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